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BRUSH UP YOUR HEALTH

BY

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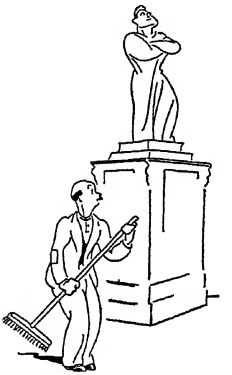
M.A., M.B., M.R.C.P.

WITH A PREFACE BY

LORD HORDER, G.C.V.O., M.D.



WITH 20 DRAWINGS BY WARD
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PREFACE

WITH all the catholicity in the world I have long ago come to the conclusion that a book on health, if it is to be really useful, can only be written by a doctor. No layman, however knowledgeable, or however cultured, can hope to preserve a proper balance between the desire to present a vast mass of unchallenged facts on the one hand and the tendency to be merely readable, or even racy, on the other.

But not all doctors who know the facts can write a good book, and not all who can write well know the facts. I do not think I am excessive in my estimate when I say that Dr Clegg possesses both these desiderata, and is, on that account, an ideal writer for the purpose.

Our author reminds us that we can make a great fuss about health and yet do precious little to see to it that we are ourselves healthy. The appeal made in this book is to the individual. And rightly so, because, in the last resort, 'fitness' depends upon what the citizen does for, and to, himself, not upon what the State does for, and to, him. This will to be well is of vastly greater importance in this highly individualized society of ours than it is in countries where authority and regimentation are the orders of the day.

You cannot have your cake and eat it. Convert the whole nation into a camp and 'fitness' follows almost automatically. But if liberty of thought and speech and action is so much the breath of your nostrils that you cannot live without it, 'fitness' can only be achieved through honestly and intelligently facing up to the questions put to you in this book and following faithfully the corrective measures that are laid down for your guidance.

Of the spate of books on health that pours incessantly around us I think I would give Dr Clegg's first place as likely to put the honest seeker on to the right path. The author covers all the ground and does it in a compass which will confuse no one, and yet give no one a chance of escape. And that is as it should be.

HORDER.

April 1938.

If you will particularly know how, and by what means, consult physicians, and they will tell you, that it is in offending in some of these six non-natural things, of which I shall dilate more at large; they are the causes of our infirmities, our surfeiting, and drunkenness, our immoderate insatiable lusts, and prodigious riot?

The Anatomy of Melancholy, BURTON.

CONTENTS

ACKNOWLEDGMENTS

I WOULD like here to record my thanks to the many authors I have consulted for what appears in this small book, and especially to Mr Douglas Fryer, Ph.D., for his kindness in allowing me to reproduce from his book *Vocational Self-Guidance, Planning Your Life Work* (Lippincott), the intelligence tests which form the substance of Chapter 20. I am also indebted to Dr E. E. Claxton for permission to reprint the weight tables in Appendix II from his book *Weight Reduction: Diet and Dishes* (Heinemann); to the British Association for the Advancement of Science for permission to reproduce the specimens of type on p. 48 from the supplement to its report on *The Influence of School-books on Eyesight*; and to the Secretary-General of the League of Nations for permission to reproduce the table in Appendix III from *Nutrition*. Final Report of the Mixed Committee of the League of Nations on the Relation of Nutrition to Health, Agriculture, and Economic Policy. (No.: A. 13, 1937, II.A.)

My thanks are also due to J. B. Lippincott Company, to Messrs William Heinemann Ltd, and not least to Messrs J. M. Dent & Sons Ltd, for their generous help and patience.

1. TAKING STOCK

> Can you account him wise or discreet that would willingly have his health, and yet will do nothing that should procure or continue it?
>
> *The Anatomy of Melancholy*, BURTON.

YOU must be sick of the word 'health,' and even, perhaps, suspicious of the lively interest at present shown in the subject. The ordinary peaceful citizen will soon be forbidden to pass into decay in his own fashion. And this fuss about health begins at a time when medicine and surgery are making enormous headway in the fight against disease. As a result people these days live longer. Although fewer children are born fewer die. It should be possible for us all to be a little careless about health without much fear of the consequences, so efficient have the medical and surgical repair services become.

What may surprise the cynic is the great interest and concern shown by doctors themselves in health. The medical profession wants people to be fit and healthy and is anxious to help them to become so. When things get to this pass you will agree that it is time you began to think seriously about it. The question has become acute, I think, because in company with millions of others you have deserted the country for the city. And although disease is kept fairly well in hand, there is, nevertheless, little positive and abounding good health. We are all more often a little below par than a bit above. Even at the risk of becoming obsessed with the matter we should reverse this state of affairs.

Apart from this ill-health costs money. Over £20,000,000 are spent yearly on proprietary medicines. The annual bill for rheumatism among the insured population is about £17,000,000. And someone has worked out that, altogether,

sickness costs this country something like £285,000,000 a year. Obviously, then, it should be worth while taking active steps to achieve health—that is, good health.

The usual reply to the question 'How are you?' is 'Oh, not so bad. Nothing to grumble about.' This really means: 'Not so bad as I used to be (unfortunately), but please don't imagine that *I haven't* got something to grumble about.' There is, unless I am mistaken, a general reluctance to claim too much health, as if this might tempt Fate to readjust matters on the debit side. And to have a little ill-health up one's sleeve is not such a bad thing. It provides a temporary excuse for not immediately meeting unavoidable obligations, and often an excellent reason for not doing what can without disaster be easily left undone. 'I was *so* tired, utterly exhausted, my dear. I had such a splitting headache, such a *fiendish* cold'—and so on. Bad health is positively essential to one's well-being. Without it one could not appreciate what it is to be 'as well as can be expected.' Without it the nobler sentiments of pity, sympathy, and charity would wither. What would the millionaire do with his surplus wealth and the maiden lady with her surplus emotions if they could not let them overflow in the cause of the sick and the suffering? But still, this book is not supposed to be in praise of ill-health, and professional ardour must be checked.

To return then to the important question of the attitude to health—*your* attitude, noble reader, will determine how much benefit you may get from reading this book and the many other guides to the better life. Do you really want to be healthy, and if so why and for what? This seemingly ingenuous question is the root of the whole matter, and you may not find the answer so simple. It may be that as a result of close self-examination you will find a lurking desire to cling on to that pain in the back, that stiffness in the joint, that engaging air of lassitude. Nevertheless, such a discovery, although at first humiliating, will be a step in the right direction.

Having found in yourself a certain affection for ailments, a wish to be, if not ill, at least not too well, you may then

come to know of what value is the particular complaint you fancy at the time. Unless it was of some use to you I do not think you would countenance it. It may enable you to escape certain situations and obligations. It may serve as an excuse for imperfections that cannot be hid from the world. It may be a means of attracting attention and sympathy. It may serve to put you into a position of dependence on others and be a means of binding them to you. If your analysis of the situation is carried to the point of finding the right answer, then you may happily observe your complaint dissolve into thin air.

THE CLERK DOES NOT NEED TO BE AS FIT AS THE BOXING CHAMPION

At all events, having decided that you are not healthy — as undoubtedly you are not or you would not be reading this — and that you wish to be so, it would be as well to answer the question why and what for? I suppose that a professional boxer would not feel really fit unless he could last out, say, a dozen rounds with an opponent of his own calibre. Such degree of physical fitness in a civil servant or a cabinet minister would be dangerous. A clerk in an office might be content to be just fit enough to do his work sufficiently well and without fatigue and to be able to walk as far as the local cinema in the evening. With exceptionally good luck he might scrape through life without any major disaster other than the one which will carry him off to the final destination of all travellers.

The clerk does not need to be as fit as the boxing champion, but he is anatomically less well adapted to working in an office than the latter is to fighting. The great muscles of the trunk and the powerful masses of flesh enveloping

shoulder, hip, and thigh seem out of place in the urban civilization which is apparently to us the highest good. The horse is better adapted to running and the fish to swimming than the city worker to sitting on an office stool: for this sessile kind of life he would be more comfortable with a prehensile caudal apparatus with which he could clamp himself to his seat. His back is uncomfortably mobile and apt to get set in a position that cramps the soft organs in the chest and the abdomen. The muscles of his belly become lax for want of exercise, and a pendulous frontage fits awkwardly into the office desk. All this militates against good work, and brings in its train a sense of bodily discomfort. Bodily discomfort induces mental discomfort, and the latter enhances the former, and so the vicious circle is drawn neatly round the sufferer, whose efficiency inevitably gets less and less.

Health, therefore, has its commercial advantages, as firms which provide sports grounds for their employees must be fully aware. The humble clerk who has his eye dimly fixed on the high-powered executive post in the future should look upon his body as a safe to be made as secure as possible against that racketeering gangster ill-health.

This, of course, is putting the matter on rather a crude cash basis, by suggesting that health will be worth while from a business standpoint. But even the world's hardest worker has his moments of relaxation and a simple desire to enjoy life. And he cannot enjoy life if he is constantly reminded of things about himself that he hates. If he could be persuaded—or, better, if he could persuade himself—that health is something that can be positively enjoyed for its own sake he might pursue it as ardently as he pursues wealth, and take as much interest in health-giving measures and activities as he does in a new car model or a television set. Unfortunately health is not pursued; it is looked upon with suspicion and as something which is too good to be true. If you, decrepit and dyspeptic reader, will regard health as something exciting and withal rare, and therefore worth possessing, you are half-way to getting your money's worth out of this small volume.

It might be thought that this is a plea that office boys should all be potential light-weight champions, and that sound and supple muscles and smoothly running viscera will land us in a Utopia to-morrow. This is not so. There is inside us that striving, willing, feeling (and sometimes thinking) apparatus we call the mind, and without health in this there can be no health in the body, and ill-health in the body will wear down even the strongest mind. Although for purposes of discussion, experiment, or instruction, we may isolate this part of the body or that function of the mind, it cannot be too strongly emphasized that body and mind constitute the whole person, and that any regimen of health which exalts one above the other will produce a caricature of *homo sapiens*. So close is the interaction between body and mind that it is probably true to say that no disorder of the one can exist without its counterpart in the other. The inflammation of the brain in sleepy sickness may completely pervert the morals of a normal healthy child. A tumour of the suprarenal gland may induce mental and physical characteristics of a male in what was formerly a normal young woman. By suggestion a hypnotist may raise blisters in the hypnotized. Emotional conflict may literally paralyse speech or movement, or produce blindness. These are but some of the more dramatic events in the contest. There is, of course, a brighter side. A comedian may make your bones and muscles ache from laughter. A man may be so engrossed in playing a game as to be oblivious to the pain and disability of a torn muscle or a broken bone.

But coming back to the more important question of your health, I would suggest that the matter can be reduced to quite a simple formula: You can't be healthy unless you are happy. Happiness, you will retort, is no concern of the doctor's. He can't prescribe a dose of happiness to be taken three times a day in a wineglass of water. Unfortunately this is true. And it is true that it is not his place to tell you what to do to be happy nor even to define what happiness is. He can, however, tell you that if you are miserable, discontented, bitter, envious, good health will not be yours for the asking, and that ill-health will stand a fair chance of

gaining the upper hand. He can go even further and investigate the causes of your dis-ease of mind, so that being acquainted with them you may apply the remedy. Failing his assistance you may yourself inquire within, and so take stock of your mental and emotional equipment.

Before then proceeding to brush up your health determine at the outset just how much health you may have left to brush up. The following questionnaire may be filled in, and you can apportion the marks as you think fit. Don't be too depressed at the result, and if in doubt ask your doctor before it is too late. In any case it is probably some time since you were last overhauled.

These questions need not be taken too seriously. A high score under 'Yes' would indicate roughly that something ought to be done about it.

Am I	*Yes*	*No*
Too fat?	.....	.....
Too thin?	.....	.....
Losing weight?	.....	.....

Am I	*Yes*	*No*
Too hungry?	.....	.....
Not hungry enough?	.....	.....
Costive?	.....	.....
Dyspeptic?	.....	.....
Pale or anaemic?	.....	.....
Flushed about the nose?	.....	.....
Short of breath on running for a bus?	.....	.....
Short of temper when I miss it?	.....	.....
Full of envy, hatred, and malice?	.....	.....
Unaware that other people do exist?	.....	.....
Too aggressive?	.....	.....
Too submissive?	.....	.....
Full of grievances?	.....	.....
Easily suspicious?	.....	.....
Easily tired?	.....	.....
Always sleepy?	.....	.....
Subject to depression?	.....	.....
Do I	*Yes*	*No*
Eat too much?	.....	.....
Eat too little?	.....	.....
Have a bad appetite?	.....	.....
Feel discomfort after meals?	.....	.....

Do I	*Yes*	*No*
Have pain after food?	.....	.....
Get unduly tired after exertion?	.....	.....
Cough?	.....	.....
Suffer aches and pains anywhere?	.....	.....
Smoke too much?	.....	.....
Drink to excess?	.....	.....
Wake up tired in the morning?	.....	.....
Fear other people?	.....	.....
Terrify other people?	.....	.....
Hate other people (without reason)?	.....	.....
Become anxious about trivial things?	.....	.....
Sleep badly?	.....	.....
Believe the world is coming to an end?	.....	.....
Go about with a foreboding sense of disaster?	.....	.....
Loathe the society of others?	.....	.....
Detest my work?	.....	.....
Feel misunderstood?	.....	.....
Dislike music?	.....	.....
Dislike literature?	.....	.....
Frequent the movies?	.....	.....
Do unto others, etc.; or leave it to them?	.....	.....

Have I	*Yes*	*No*
Insured my life too heavily?	.....	.....
Overestimated my abilities?	.....	.....
Overtaxed my strength?	.....	.....
Been to the dentist recently?	.....	.....
A family doctor?	.....	.....
A sense of humour?	.....	.....
An aim in life?	.....	.....
Too many aims in life?	.....	.....

2. YOUR DAILY BREAD

> And well it [diet] may be called material cause, since that, as Fernelius holds, 'it hath such a power in begetting of disease . . . that a man may say, this diet is the mother of diseases, let the father be what he will, and from this alone, melancholy and frequent other maladies arise.'
>
> *The Anatomy of Melancholy*, BURTON.

YOUR score has probably made you feel a bit depressed, or at least less pleased with yourself than you were. But self-mortification, although it has its pleasures for the morbid, should not enwrap you too closely. The task of rehabilitation must proceed. *Ex nihilo nihil fit*, and flesh and blood are made from the stuff that is taken into the body and incorporated in it. It is possible to make or mar the body by the kind of food you give it, and just as an army cannot march on an empty stomach, so a nation cannot get fit if it is badly or under-nourished. Physical jerks on a faulty diet will do more harm than good.

This is the hey-day of food-fans and food-faddists. Amateur dietitians flit from one continent to another with their one and only way to dietetic salvation. Slimming experts advertise their remedies in the press, and the dangers of night-starvation are broadcast to the heavens. People have died from taking slimming tablets. Others are scared into the belief that acids are corroding their vitals, that they are suffering from 'acidosis.' They then swallow wholesale (or, rather, retail) alkaline powders, and suffer from 'alkalosis.' In their dietetic follies all men are equal.

These follies may be but an expression of nutritional unease, and of deeper folly. Sir John Orr has estimated that over 50 per cent of the population is consuming either not enough or not the right kind of food. No wonder the bottle of medicine is so popular. Yet it would be a mistake to say that things are not better than they were. A general im-

provement in dietetic habits has been going on for some time, and the decline in the death-rate from certain diseases has been correlated with this improvement. Conversely, adverse food conditions can lead to a rising death-rate. In the War, it is stated in the Final Report of the Mixed Committee of the League of Nations on Nutrition, etc., 'the general death-rate, and especially the death-rate from tuberculosis—a still more sensitive index of nutritional conditions—rose in all countries (belligerent and others) where food restrictions were imposed on the population.' In some cities the general mortality rates in poor districts are 50 per cent higher than in wealthy districts. The report goes on to state: 'There is no doubt that improvement in social conditions, and especially in the feeding of the population in these poorer countries, boroughs, and districts, would bring about a considerable increase in health and save many lives.'

You may retort that you are not living under war conditions, or on the starvation level: but these observations may convince you that this food question is the root of the matter of health. For the sceptical here are some more facts. Berlin children who were born in 1918 and went to school in 1925 were 2 to 2½ inches shorter and 2 to 3 lb. lighter than children of the same age who went to school in 1933. Boys in a boys' home near London receiving the addition of one pint of milk daily to an ordinary diet put on 7 lb. and grew 2·63 inches in one year: others not receiving the additional milk gained only 3·89 lb. and 1·84 inches. A dietetic experiment in an English public school showed that the substitution of butter for vegetable margarine led to increase in height and weight, a great decrease in broken bones on the playing-fields, and a decrease in rheumatic conditions. In another institution it was found that a pint of milk added daily to each boy's diet reduced the incidence of nasal catarrh and the tendency to chilblains, and improved the general vitality as well as increased the rate of growth. By taking milk you can evidently add a cubit (or part of one) to your stature.

The old tag about the goose and the gander, of course, applies to human beings as well. The Greenland Eskimos

live almost exclusively on a carnivorous diet—they eat their meat raw and apparently flourish. The inhabitants of Tristan da Cunha live chiefly on potatoes, milk, and fish. They eat very little meat. Vegetables are plentiful, and so are the eggs of the penguin and the albatross in the nesting season. The inhabitants are in excellent health, and decayed teeth don't exist—or at least didn't up till 1932. Since then sugar has been introduced, and the teeth are now not so good. The women are said to be more intellectual than the men, but this may be because there is no money in the island.

The natives of New Guinea used to eat each other: in a report by the Australian Government on this unpleasant subject it is stated: 'Cannibalism was a definite adjunct to the protein diet, and this is not to be wondered at, considering the extreme scarcity of almost all forms of game in the territory.' The mortality rate in New Guinea, as elsewhere, was largely a question of nutrition.

Your own dietetic habits may be beyond reproach, and if you can afford a good mixed diet—afford anything, that is, outside the luxury foods (e.g. caviare, oysters)—you will probably not lack such essential constituents as vitamins, minerals, and first-class protein. It is, nevertheless, not improbable that your daily menu could be improved in some respects. You might profitably drink more milk and less beer, consume less sugar, eat more fruit. Whatever you do or may not do some knowledge of dietetics may help. It is not my purpose to give you menus or recommend plover's eggs for tea. It is, rather, to put before you some of the principal facts, partly because they may be interesting in themselves, but chiefly that you may make use of them.

One obviously cannot avoid saying something about calories. They have come to stay, so we must make the best of them.

A food calorie, or kilocalorie, is the amount of heat required to raise 1 kilogram of water 1° C. The British Medical Association Nutrition Committee in 1933 decided that the average adult man not performing strenuous manual labour requires 3,400 calories daily purchased as food: 400

were allowed for waste in preparation. The B.M.A. Committee later conferred with the Ministry of Health, and between them they drew up a sliding scale of calories for people of different ages and performing different amounts of work. The League of Nations experts decided that the average adult not engaged in manual work requires 2,400 calories net a day. Obviously a farm labourer needs more calories than the city magnate, as he expends more muscular energy, and is also exposed to climatic conditions that demand a greater output of bodily heat. The farm labourer eats bread and cheese; the city magnate a city luncheon—that is why he looks prosperous. It was estimated by these committees that a child between twelve and fourteen years of age needed as many calories as a man doing light work; that a girl between fourteen and eighteen needed more, and that a boy between fourteen and eighteen should have as many as a man doing moderate work.

Calories are obtained from the three organic food substances, protein, fat, and carbohydrate, which should be taken (in terms of calories) roughly in proportions of 14, 31, and 55. A standard diet, for example, of 100 grammes of protein, 100 of fat, and 400 of carbohydrate will yield a total of 2,980 calories (1 gramme of protein provides 4·1 calories, 1 gramme of fat 9·3, and 1 gramme of carbohydrate 4·1).

As far as calories are concerned they can be bought most cheaply in the form of carbohydrates. And that unfortunately is what is often done—at the expense of the fats and proteins. The balanced diet should preserve approximately the proportions given above, and from the tables given at the end of any book on dietetics you should not need *Brush up Your Wits* to work out your own menu on the basis of about 3,000 calories a day.

But you can't live on calories alone. The way in which you buy your calories, even granted the right proportions, is important. One can put it another way by saying that you should concern yourself more with getting a 'well-mixed' diet than a well-balanced diet, although there is no harm in your knowing what ideas the experts have about what is the correct balance.

3. THE FLESHY PART

The lean of fat meat is best.
The Anatomy of Melancholy, BURTON.

PROTEINS are complex molecules of carbon, hydrogen, oxygen, nitrogen, and of such other substances as sulphur and phosphorus. They are made up of simpler molecules known as amino-acids. Certain amino-acids are essential for the human body; there are about twenty-five of them which are. That is why some forms of protein are better than others. The white of an egg is protein, so is lean meat, so is casein—the curd of milk. When you eat meat enzymes in the juices of the stomach and the intestines break down the protein into its constituent amino-acids. These pass into the blood, and are built up into body tissue and make good the wear and tear that is always going on. If there is a shortage of carbohydrate the liver may turn some of the amino-acids into sugar. It deals with surplus amino-acids by splitting them into ammonia (which in turn is converted into urea), and glucose, and fatty radicals.

Protein is, *par excellence*, the body-builder. Some proteins are called first-class. The others are not so good for our purposes. The proteins of meat, egg, and milk are first-class, and better for the body than vegetable proteins. These first-class proteins also have a stimulating effect on the metabolism of the body. It is called 'the specific dynamic effect,' which probably explains why Caesar did not like lean men. At least half of the protein in an ordinary diet should be of this first-class variety—that is, be of animal origin, the glandular organs such as liver, kidney, and pancreas being especially good sources of supply.

Too much protein, as too little, is, of course, bad, and has been thought to be partly responsible for chronic kidney disease and high blood pressure.

Some people have a constitutional objection to uric acid. Those who object too strongly get gout. Gout, however, is much less common than it was. So far as I know uric acid and backache have little in common, and you need not walk in fear of the former. Uric acid comes from what are known as purines, and these from the nucleoproteins. Foods rich in purines are sweetbread, liver, beef, mutton, pork, veal, chicken, and fish. If therefore you are afraid of uric acid cut these down and take your protein in the form of milk, eggs, cheese, and vegetables.

4. THE VIRTUE OF FAT

Husbandmen, and such as labour, can eat fat bacon. . . .
The Anatomy of Melancholy, BURTON.

FATS are formed by the combination of organic acids with alcohols, and are made up of the elements carbon, hydrogen, and oxygen. Fats supply calories in their most concentrated form, and have the advantage that they can be stored in the tissues of the body. The fat under the skin reduces loss of heat; it protects underlying tissues against mechanical injury; fat makes the body more buoyant. Fatness used to have an aesthetic value, and in some old-fashioned parts of the world still has. The evils of obesity will be referred to later, but here it must be stressed that fats are of great importance because of the fat-soluble vitamins A and D which they contain. There is another one called F which seems to be necessary for growth. A qualitative deficiency of fat in the diet is therefore more serious than a quantitative deficiency. It 's the kind you eat that matters most.

A relative excess of fat over carbohydrate in the diet may cause a condition known as acidosis (or, more correctly, ketosis), with the accumulation in the body of what are called acetone bodies. This is not uncommon in children,

who may become quite ill as a result. Temporary removal of fat from the diet puts things right. This shows again the necessity of a well-balanced diet.

Fat is best taken in the form of butter, milk, cheese, eggs, liver, and fat fish such as herrings, because these are excellent purveyors of vitamins A and D. Remember the experiment referred to earlier in which the substitution of butter for vegetable margarine produced an increase in height and weight and a decrease in rheumatic conditions among boys in an English public school.

5. A SWEET TOOTH

> All excess, as Epictetus argues, will cause a dislike; sweet will be sour, which made that temperate Epicurus sometimes voluntarily fast.
>
> *The Anatomy of Melancholy*, BURTON.

IF you are cursed with a sweet tooth don't read any further, because sugar—i.e. excess of sugar—is beginning to get rather a bad name in the world of dietetics. Sugars and starch, again, are compounds of carbon, hydrogen, and oxygen.

Sugar passes from the intestines into the blood as glucose; this is the simplest form of sugar, and is called monosaccharide. Cane sugar, beet sugar, and malt sugar are called disaccharides, and have to be broken down to the monosaccharide glucose before entering the blood. Starch is a polysaccharide. It also has to be converted into glucose, the process starting in the mouth; that is, one should chew starchy foods instead of swallowing them neat.

Sugar provides calories in a cheap form, and is immediately available for the supply of energy. It is stored in the liver and muscles as a polysaccharide known as glycogen, and this is converted again into glucose when required.

Deficiency of sugar in the diet probably happens only in bad cases of starvation. Excess is far more common, and the increase in its consumption during the past century has been the outstanding change in the food habits of millions of people. The world production of beet sugar and cane sugar in the year 1893–4 was 3·8 million tons and 9·8 million tons respectively; the corresponding figures for the year 1930–1 were 11·5 million and 29·2 million tons. In 1840 the people of Scotland consumed 17 lb. of sugar per head; in 1850, 30 lb.; in 1899, 82 lb.; and in 1936 about 100 lb. The first cargo of sugar was brought to England in 1563 by Sir John Hawkins. It was a luxury then; now it is a menace. 'Things sweet to taste, prove in digestion sour.' Sugar has no other virtue than the fact that it is sugar. It does, of course, supply energy in a form that can be quickly utilized.

CURSED WITH A SWEET TOOTH

But carbohydrate can be taken in other forms. The danger is that sugar tends to displace such valuable sources of carbohydrate as potatoes and cereals, and during recent years there has been a falling off in the consumption per person of the latter. These other sources are more valuable because they supply minerals and vitamins as well as carbohydrate in the form of starch. Potatoes, for example, contain vitamin C, the husk of cereals vitamin B and minerals, and the germ of wheat vitamins B and E and minerals. Potatoes also retain a high proportion of their vitamin C after cooking.

Apart from the risk of replacing these more useful carbohydrates sugar in excess has been responsible for a number of disorders. It is generally agreed that catarrh is encouraged by excess of sugar, and American workers claim to have diminished susceptibility to colds by ordering diets

in which refined flour and refined sugar are reduced to a minimum, and the fat and vitamins increased. Acid fermentation of sugar is thought to be partly responsible for decayed teeth. Excess sugar causes catarrh of the stomach, and Sir Arthur Hurst considers 'carbohydrate dyspepsia' to be one of the commonest digestive disorders of the day. One of the end-products of bacterial attack on carbohydrates in the intestine is oxalic acid. Oxalic acid is excreted in the urine in the relatively insoluble form of calcium oxalate. Oxalate stones may form in the kidney.

The insulin formed by the pancreas is necessary for the proper utilization of sugar by the body. When not enough insulin is manufactured diabetes results. The more sugar eaten the greater the strain put upon the pancreas. Although over-eating of sugar cannot be said to be the cause of diabetes, the increase in this disease has coincided with increase in the sugar consumption.

Lastly, those who are anxious to stand at the top of the political staircase should fight shy of sugar. Read, for example, what Princess Lieven wrote to Metternich: 'All you say about Lord Grey is perfectly true. Ambition is what keeps him alive and struggling: but he will never be a minister. He eats too many sweets. That is what Lady Cowper told me, and it is a very sound reason. He is bilious: his impaired digestion which makes him so ill-tempered ruins all his chances.'

6. BROWN BREAD OR WHITE?

. . . Coarse bread at all times. . . .
The Anatomy of Melancholy, BURTON.

THIS sugar question, then, plays a big part in the process of brushing up your health, and you should begin at once by cutting sugar down. Eat potatoes instead, and cereals. Unfortunately people all over the world have developed the

bad habit of taking away the valuable outer part of cereals. Orientals polish their rice and die of beri-beri. We in the West eat white bread and run the risk of vitamin B starvation. White bread is made from wheat, the bran and the germ of which have been removed by excessive milling. Ordinary brown bread contains bran, but very little germ. Whole-meal bread contains germ and bran. The bran contains vitamin B and minerals, and the germ vitamins E and B and minerals. During the past one hundred years the consumption of bread and flour has fallen considerably. Even the idle rich are getting less vitamin B in the form of bread than the parish poor did in the early part of the nineteenth century. The *British Medical Journal* has stated that there is 'good reason to regard vitamin B_1 deficiency as an outstanding fault in the diet of many millions of people in this country.' Sir Robert McCarrison has shown that a deficiency in this vitamin leads to disease of the digestive tract, and disease of this tract is rife in Great Britain.

The health lesson is clear. Eat brown bread or whole-meal bread. Eat more potatoes. Cut down sugar and cakes and pastries made from refined flour. Be ashamed that you ever had a sweet tooth.

7. MINERALS AND WATER

> Paracelsus and his chemistical followers, as so many Promethei, will fetch fire from heaven, will cure all manner of diseases with minerals, accounting them the only physic on the other side.
>
> *The Anatomy of Melancholy*, BURTON.

ALL flesh (i.e. muscle) may be grass, but 75 per cent of it is water. About 60 per cent by weight of the body is water. An average 3,000 calorie daily diet provides about 2 litres of water, and about another $1\frac{1}{2}$ litres should be taken to bring your fluid consumption to the proper level. Should

one drink this extra water at or between meals? Well, some people seem to get away with it without much trouble. Others don't. But the stomach has its work cut out to deal with the food dropped into it, which has to be thoroughly mixed with the gastric juice so that the enzymes may proceed with their task of breaking down the proteins and the fats. If you increase the load on the stomach by pouring fluid into it at the same time you are obviously going to interfere with its task. Therefore eat your meals dry. One advantage of this is that you are not likely to over-eat.

THOSE TO WHOM THE IDEA OF SALT WATER IS NAUSEATING

Water passes out of the body by the kidney, the bowel, the lungs, and the skin, and through the last a considerable amount may be lost by sweating. In profuse sweating a good deal of salt is also lost, and if this is carried too far the 'sweater' may suffer from severe muscular cramps. You probably will not sweat as much as this; you may even not sweat enough; but if, say, you are so rash as to play squash rackets for an hour at a stretch a little salt in the water you drink at the end of the game will restore the balance. Those to whom the idea of salt water is nauseating will find the salted potato chips on the bar counter more acceptable.

Common salt, sodium chloride, is a most important constituent of the body, especially of the fluids present in the tissues outside the cells. Probably no one suffers from a shortage of salt in the diet. Other elements besides sodium chloride are of course essential to the body. Vegetables and fruit provide the potassium and magnesium which are

necessary to physical well-being. Lack of calcium, however, is not uncommon, and this element is essential for children and for pregnant women. Calcium salts form the basis of bone; without them the bones would wilt, as indeed they do. Calcium regulates the excitability of nerves, and is necessary for the proper contraction of heart muscle and for the clotting of blood. Calcium cannot be utilized without the assistance of vitamin D (see later), so it is necessary to secure adequate amounts of both in the diet.

The best sources of calcium are milk, cheese, butter, and green vegetables.

Although you may be depressed by the information that what you thought to be all too solid flesh is largely water, you may be consoled by the fact that you carry about with you a number of much sought-after metals. They are present in only minute amounts, so a revival of the ancient practice of body snatching would not necessarily be profitable. Zinc, manganese, cobalt, copper, nickel, silver—and even tin—have been found in the body. Silver is apparently a normal constituent of tonsils. It may, of course, have got there as a result of the suspicious habit of biting silver coins. When rats are deprived of manganese the pleasant relations normally existing between mother rat and her offspring are violently disturbed, but no logician, so far as I know, has worked out the connection between manganese deficiency and mother fixation. Manganese, by the way, is another of the substances present in the germ of wheat. Lithium, rubidium, cadmium, and chromium have also at times been found in the body by the inquisitive chemist, but you can brush up your health without worrying too much about these.

In the chromium-plated outfit that you appear to be the commonplace metal iron finds a prominent place. There are 3 grammes of it in all the red blood corpuscles that perambulate in the course of your circulation. Iron is needed to make the haemoglobin of the red blood cell. The haemoglobin carries the oxygen from the air inhaled into the lung to the remotest parts of the body. If you don't eat enough iron you won't have enough haemoglobin, and so will suffer from anaemia. Iron is obtained from green

leafy vegetables, especially spinach and watercress, unmilled cereals, the yolk of egg, liver, lean meat, peas, beans, dried currants and raisins, and cocoa. Copper, too, plays a part in the formation of haemoglobin, and it has been shown that this may have to be given with iron to cure anaemia in children. Copper is present in such foodstuffs as calves liver, cocoa, mushrooms, lentils, nuts, wheat bran and germ, currants, and, you will be glad to hear, in oysters.

Of other non-metallic elements iodine is important because it is an essential constituent of thyroxine, the hormone of the thyroid gland, which keeps the body fires burning. In some geographical regions iodine is deficient and goitre and cretinism afflict the population. Sea-fish constitute a useful reservoir of iodine, and in Japan, where sea-fish bulk large in the diet, goitre is uncommon. Additional iodine—e.g. in the form of iodized salt—is advisable for pregnant women.

The kind of information I have given above will perhaps convey some idea of the importance of including such things as whole-meal bread, green vegetables and fruit, and animal protein in your diet, and serve as a warning against the excessive consumption of sugar and refined flour.

8. MILK

> The Tartars . . . drink milk and blood, as the Nomades of old.
>
> *The Anatomy of Melancholy*, BURTON.

You obviously do not need calculating machines to work out the number of calories you require. The extent of your girth will indicate whether you are consuming too many calories for the amount of energy you are putting out. At the same time it is easy to be complacent about the virtues of a 'good mixed diet.' On analysis it may prove to be not good enough or not mixed well. The appetite, unfor-

tunately, grows with what it feeds upon, and it often feeds upon the wrong thing (e.g. sweet stuffs). The children of the rich, in fact, may be as ill-nourished as the children of the depressed poor.

For both there is one food-stuff that is unique as a source of all that is dietetically desirable. Fat, sugar, first-class protein, minerals, vitamins, are all present in the most elegant proportions. It is relatively cheap and always on tap. It can be taken neat, and requires no preparation at home. It wards off night-and-day starvation, and kills acidity. Pastoral peoples looked upon the land that flowed with it as the nearest approach to heaven on earth. It is used in cosmetics, ointments, distempers, and appears in such surprising forms as inkstands, cigarette holders, manicure sets, and the handles of knives and forks. I cannot hide from you any longer the fact that I am talking about milk, the most perfect and the most dangerous food in the dietetic calendar.

FINE PHYSIQUE, GOOD HEALTH, AND VIRILITY

The fat of milk, by itself or as butter, is a good source of vitamins A and D, when it comes from cows fed on pasture. Milk is especially rich in phosphates and calcium salts, indispensable elements in every cell of the body and giving the structure and hardness to bone. The carbohydrate in milk is beyond reproach, and the protein just what is wanted for growth. Lest you think I am too lyrical about milk, listen to what the Mixed Committee of the League of Nations has to say about it: 'Fine physique, good health, and virility are usually seen in races where milk has an important place in the diet. . . . The contrast in health, strength and stamina is proverbial among the hill tribes of India, who partake largely of milk, and those dwelling in the plains,

where the diet is more exclusively vegetarian, and consists largely of cereals.'

The high nutritive value of milk is at all events appreciated by bacteria, which flourish in it. That is why it is so dangerous. Septic sore throat, scarlet fever, diphtheria, typhoid, undulant fever, tuberculosis—all these diseases can be conveyed by milk. You should then make sure that the milk you drink has been either pasteurized or boiled: it will then be safe. Preferably it should come from tuberculin-tested cows. Drink T.T. milk pasteurized, and you will flourish as the bay-tree. Authorities on nutrition recommend that expectant and nursing mothers should take two pints of milk a day, children between one and two pints, and the rest of the population not less than half a pint.

9. VITAMINS

> Pomegranates, lemons, oranges are tolerated, if they be not too sharp. Some approve of potatoes, parsnips, but all corrected for wind.
>
> *The Anatomy of Melancholy*, BURTON.

VITAMINS are definite chemical substances, and their function is to guide physiological activity along normal channels. They are analogous to the hormones (chemical messengers) secreted by the ductless glands. They urge the body on to do the right thing by itself. Vitamin D, for example, makes it possible for the body to utilize the calcium salts contained in milk. Calcium without vitamin D is just no good at all. I think you will agree with me that it is difficult to work up any enthusiasm for things designated by letters of the alphabet. In time, perhaps, this A, B, and C business will be done away with.

Vitamin A. Constrained by custom, then, we will begin with fat-soluble vitamin A. Into its composition enter the

familiar elements carbon, hydrogen, and oxygen. It is derived from Carotene, the yellowish pigment of plants. Carotene gives butter its yellow colour. (I am not inferring that the cow is a plant. But it eats plants.) If vitamin A is excluded from the diet of young animals, they stop growing, lose weight, and die. Deficiency of vitamin A in the diet leads to retardation of growth; dryness and spottiness of the skin; dryness and inflammation of the conjunctiva of the eye, the cornea of which may ulcerate (all this is called xerophthalmia); inflammation of the mucous membrane of the alimentary tract and of the air-passages; and night-blindness. Vitamin A, in fact, helps to keep the cells of the surface coverings of the body in a healthy state. The discovery that night-blindness is caused by vitamin A deficiency has been utilized in a method for detecting various degrees of this dietetic deficiency. Hippocrates, wise in many things before his time, recommended whole ox liver as a remedy for night blindness: liver contains a lot of vitamin A, for this is the organ in which it is stored.

The best source of vitamin A are the liver oils of fish, and in the winter in this country you would be advised to take extra vitamin A in the form of cod-liver oil or halibut-liver oil. The vitamin is present in such foods as butter, milk, cream, cheese, egg-yolk, liver, apricots, carrots, green lettuce, peas, spinach, watercress. Winter milk, and products made from winter milk, may not have much vitamin A as the cows are not fed on pasture. Vitamin A resists heat, and is not destroyed in the processes of preparing food. It is worth noting that the outer green leaves of lettuce and cabbage are richer in vitamin A than the inner, pale, more succulent leaves: why throw the former away?

Vitamin D. Forgive this breaking away from the strict alphabetical sequence, but vitamin D has this in common with A: it is soluble in fats. As has been pointed out already, vitamin D is necessary for the proper use by the body of calcium. In 1919 Sir Edward Mellanby, now Secretary of the Medical Research Council, showed that rickets was the result of the *absence* of some substance in the diet—something present in cod-liver oil, because this cured

rickets. It was first of all thought that deficiency of vitamin A, known to be present in cod-liver oil, caused rickets. Before this it had been proved as conclusively that rickets was due to the absence of fresh air and sunlight. Then a German doctor cured rickets by exposing his patients to ultra-violet light. The common factor was found to be vitamin D.

The effect of ultra-violet light and of sun-light had to be explained. It was found that ultra-violet light, whether from a mercury vapour lamp or from the sun, converts a substance called ergosterol in the fat under the skin into vitamin D—also a compound of carbon, hydrogen, and oxygen. This vitamin can be made artificially by irradiating ergosterol with ultra-violet light: it appears in the form of beautiful needle-like crystals, and is called calciferol.

Like vitamin A, vitamin D is stored in useful quantities in the liver-fats of fish, but plant products as a whole are devoid of it. There is no vitamin D, for example, in spinach. It is present in egg-yolk. It is resistant to heat.

(There is some argument as to whether the artificially produced calciferol is identical with the naturally existing vitamin D.)

The scarcity of this vitamin in the vegetable kingdom and the fact that winter milk and butter do not contain very much of it make deficiency of vitamin D in this country a probability to be guarded against between October and May. Children, especially, should be given cod-liver oil daily in the autumn and winter months. The vitamin is also put up in concentrated form by many chemical firms, and those who do not like a teaspoonful of cod-liver oil can get the same amount of vitamin D in a neat little capsule.

Rickets, as has been mentioned, is due to not enough D in the diet: the bones are soft and bend owing to the deficiency of lime salts in them. Rickety children are also very prone to catarrh of the mucous membranes. Sir Edward Mellanby's wife has shown that decayed teeth too are the result of deficiency of vitamin D in the diet, and believes that excess of cereals in the diet also helps dental caries to develop. Towards the end of pregnancy women often get

softening of the teeth, and have to go to the dentist. This can be prevented if extra milk and vitamin D are taken by mothers throughout the child-bearing period.

Vitamin D differs from the others in that very large amounts of it are harmful, and excess causes calcium salts to be deposited in body tissues. You should not therefore eat vitamin D capsules as you eat sweets.

Vitamin E. This, another fat-soluble vitamin, is present in vegetable oils (e.g. in lettuce and watercress), especially in the germ of wheat. Deficiency of this vitamin is not likely to arise, but a number of women liable to habitual abortion have been enabled to go through pregnancy normally after taking doses of wheat-germ oil.

Vitamin B. There are at least six vitamin B's, neatly labelled B_1, B_2, B_3, and so on.

Vitamin B_1, now called aneurin, has been isolated and is a compound of carbon, hydrogen, oxygen, nitrogen, and sulphur. It is present in yeast, wheat-germ, rice polishings, nuts, leguminous seeds, malt extracts. It is also present in the yolk of egg, liver, kidney, oranges, parsnips, potatoes, artichokes, leeks, cabbage. People who *will* eat white bread should take vitamin B in the form of marmite (yeast extract) or bemax (wheat-germ). Sir Robert McCarrison has shown that vitamin B deficiency is responsible for a large number of the common disorders of the digestive tract, and it seems probable that such deficiency is common in this country. The extreme result of vitamin B deficiency is seen in the East where the diet consists almost exclusively of polished rice. The disease resulting from this deficiency is called beri-beri, and is in fact a general neuritis. In 1925 just on 18,000 people died of beri-beri in the Philippine Islands. These deaths could have been prevented.

Vitamin B has been given, with successful results, to patients with neuritis in this country. If the prodigal son had alcoholic neuritis he probably could not have done better than to eat the husks that were thrown to the swine. Some medical men believe that lack of vitamin B may play a part in the causation of rheumatism. Vitamin B is also concerned in the metabolism of carbohydrates, and it appears

that the more sugar you eat the more vitamin B you need. A sweet tooth, then, may nullify the good effect of the vitamin B in your diet.

A well-known medical textbook states: 'A scrutiny of an ordinary diet for its amount of vitamin B will usually show a deficiency of this vitamin, which deficiency is a probable cause of many cardiac and digestive symptoms.' Medical textbooks are notoriously conservative, so this warning should suffice.

Another of the B vitamins—vitamin B_2—has been isolated, and termed lactoflavin, the greenish-yellow pigment in whey. Yeast, liver, kidney, and many yellow vegetable products contain this vitamin. If animals are deprived of it they die. Lack of it causes dermatitis. It is necessary for growth. Deficiency of some of the B vitamins (according to the experts there are certainly six of them) is probably the cause of a disease occurring among people for whom maize is the staple food, and known as pellagra, which is characterized by alimentary disorders, inflammation, pigmentation, and thickening of the skin, soreness of the mouth and tongue, and by nervous disturbances. In 1933 2,800 people died of pellagra in Roumania; in 1928 nearly 7,000 people in the United States died from the same disease. Deficiency of B is obviously a serious matter.

Vitamin C. In the eighteenth century Captain Cook found that he could prevent his sailors developing scurvy by giving them fruit and vegetables. About the same time a British naval surgeon, Lind, discovered that scurvy could be prevented and cured by taking orange juice. Yet outbreaks of scurvy were not uncommon in the Great War, especially among prisoners. Scurvy is the result of deficiency of vitamin C in the diet.

Vitamin C has now been isolated as ascorbic acid, and is a compound of the now familiar elements, carbon, hydrogen, and oxygen. Orange juice, lemon juice, *fresh* lime juice, and tomato juice are excellent sources of this vitamin. Apples, bananas, potatoes are good sources. There is not much vitamin C in milk, and what there is is destroyed when the milk is heated. Vitamin C is easily destroyed by heat

in the presence of air, and cooking with sodium bicarbonate also puts it out of action. In modern canning processes air is removed from the fruit before it is heated, so the vitamin C is retained in the canned product.

Although scurvy is now rare in this country it is probable that lesser degrees of vitamin C deficiency are not uncommon. Ascorbic acid helps to keep the blood-vessels in a healthy state, and is essential to the proper development of the teeth. It also assists the body to resist the action of bacterial poisons.

10. HOW TO EAT

> To preserve thine honour, health, and to avoid therefore all those inflations, torments, obstructions, crudities, and diseases that come by a full diet, the best way is to feed sparingly of one or two dishes at most. . . .
>
> *The Anatomy of Melancholy*, BURTON.

IN the belief that food is the basis of good health I have set down in the preceding sections some of the known facts of nutrition and dietetics, so that readers may know why medical men advocate certain dietetic measures. Their 's not to reason why, their 's but to eat and die, has rather been the attitude in the past. The practical expression of the new knowledge on nutrition is simple. The daily menu should be based on milk, butter, eggs, cheese, vegetables, green salads, fruit, whole-meal bread, potatoes, and meat (especially liver, kidneys, sweetbread). Sodium bicarbonate, by the way, should not be added to the vegetables in cooking, and if you throw away the water they are boiled in you throw away much that is valuable. Steaming avoids this risk. In the winter extra vitamins A and D may well be supplied in the form of cod-liver or halibut-liver oil, and additional vitamin B (marmite or bemax) would not be taken amiss. Refined sugar and the various delicacies made from

refined flour should be chewed and preferably eschewed. You should not, however, approach the table haunted by the fear that you may be missing, say, vitamin E, or not having enough calories in the form of fat. Pleasant anticipation of food stimulates the stomach to secrete its beneficent juices. 'Now good digestion wait on appetite, and health on both.' Despise not, therefore, the appeal to sight, taste, and smell. Don't make a hash of everything.

ANGER HAS A BAD EFFECT ON THE STOMACH

There is a lot to be said for eating in the company of other people, although with the reduction in the size of families and the increase in the number of those cave-like dwellings known as flats opportunity becomes scarce. Solitary eating is almost as bad as secret drinking. The eater has too much scope for introspection. Food becomes for him so much fuel. The communal eater looks upon a meal as an occasion for developing his social instincts in a leisured manner. A contented and gradual approach to the subject makes for sound digestion, and good manners and a proper respect for the feelings of the palate will militate against bolting. Communal feeding of course has its dangers, not least among

which is over-eating. I forget who it was died from a surfeit of lampreys, but know that he lived after 1066 and in the 'all-that' period. If he had kept a little hunger in reserve he would have escaped such an odious recognition in the history books.

Family meals are also not much good if they develop into family fights. If you quarrel with your wife, or worse, if your wife quarrels with you, you might as well pour the vitamins and the minerals down the sink for all the good they will do you. Anger has a bad effect on the stomach. 'I simply couldn't stomach it,' is part of our idiom, as is 'that man makes me feel sick.' Having got through the meal in peace, you should rest awhile. To do its duties the stomach needs blood, and it has first call upon the available supply during and after the meal. If you divert this blood to your muscles by rushing off to catch the 8.50 the stomach will rebel. In the same way, if you sit in the sun or have a hot bath immediately after a meal the blood will try to desert the stomach in the interests of the skin: such a conflict is bound to be harmful.

II. PUTTING THE WEIGHT

> . . . But hear the physician, he pulls thee by the ear as thou sittest, and telleth thee, 'that nothing can be more noxious to thy health than such a variety and plenty.'
>
> *The Anatomy of Melancholy*, BURTON.

IN those far-off days when the natural man inhabited the earth, he had to fight for his food. Nowadays the telephone and the motor-van bring it to the doorstep. No muscular effort on our part is required. Instead we fret our nerves in competitive cunning against the man round the corner so that we may meet the bills of the butcher and the baker. Even fighting depends more upon storing and maintaining

energy than upon expending it in a sharp and decisive encounter. In the modern struggle for existence brain makes fewer calls upon brawn than it did. Brawn, indeed, needs artificial stimulation if it is not to be overcast with fat.

In his book, *Weight Reduction: Diet and Dishes*, Dr E. E. Claxton describes that paragon of obesity, Daniel Lambert, who was born in Leicester in 1770. At the age of thirty-six he weighed over 52 stone, and his waist measurement was 9 feet 4 inches. He died at the age of thirty-nine, and a window and a wall of his room had to be removed to admit the coffin. Lambert illustrated one of the dangers of obesity—a cutting short of the natural span of days, a danger fully appreciated by insurance companies. The jolliness of fat men is proverbial. Realizing that life will probably be short they determine to make it merry. Few people comment on the slyness and low cunning of the obese, forgetting the examples of the Fat Boy in *Pickwick* and of that mountain of flesh, Sir John Falstaff, who lowered the old school tie on more than one occasion. The one virtue the fat man has these days is that he takes more time to look round him, as there is more to look round.

Disorders of the liver and gall-bladder, high blood-pressure, diabetes, are some of the conditions which afflict the obese, who also put up a poor fight in any acute illness. Apart from its obvious deposit in the superficies of the body, fat accumulates in the internal organs. Tentacles of fat put a strangle-hold (if tentacles can do that) on the muscle-fibres of the heart, which in the end may give way under the strain. I suspect the good intentions of the prophet who said: 'Make the heart of this people fat.' The fat that is visible to the eye is but a mirror of the internal obesity that is invisible. Excess of adipose tissue disturbs the balance of the body, and shifts the centre of gravity to where it shouldn't be. Faulty posture and increased weight-bearing therefore make the joints creak and the feet flat. What the fat have got to laugh about I don't know.

If you look at the table at the end of the book you will see at a glance whether you are over-weight, and if you are you

may profitably set about reducing it to a decent level and keeping it there.

Adiposity may be a sign of some disorder of or lack of balance between the ductless glands. The Fat Boy in *Pickwick*, for example, obviously had something wrong with his pituitary gland. Other patients are fat because of inactivity of the thyroid gland. These need not concern us here, but it is necessary to warn you most emphatically against dosing yourself with thyroid tablets. These should never be taken except on the advice of a doctor, nor should any other 'reducing' tablets or medicines. People have become seriously ill and have even died as a result of this dangerous form of self-medication.

Some people are constitutionally prone to adiposity. The lean and hungry sort seem able to remain thin however much they eat. But in essentials ordinary plumpness is simply the result of excess of income over expenditure. If you take in, say, 3,000 calories' worth of energy and only use 2,400, the balance will be stored in the body in the form of fat. If this process is repeated daily your capital will become uncomfortably frozen. Below is an estimate given by Dr Claxton of the calorie value of an average diet.

	Calories
¾ pint of milk (used in his tea, coffee, and for cooking) will produce	285
3 oz. porridge	68
2 eggs (used at breakfast and in cooking)	150
6 oz. bread	444
6 oz. meat or fish (e.g. average roast beef)	600
8 oz. potato	180
2 oz. butter	464
1½ oz. cheese	150
2 oz. cake	approx. 175
2 oz. biscuits	200
1 oz. sugar	123
puddings (e.g. rice and castle puddings)	approx. 680
fresh fruit (apple, pear, etc.)	50
1 pint beer	123
vegetables	say 15
Total	3707

This would be enough for a man performing quite hard manual labour, yet the diet approximates closely to that consumed by those well enough off to eat what they want, by men and women, that is, who do not toil with their hands. The average recommended for the non-manual worker is, you remember, 2,400 calories. The above diet yields an excess of 1,307. No wonder the digestive system groans and the newspapers are filled with advertisements telling you how to get rid of your waste.

The remedy is simple and in your own hands. A little intelligence and a lot of perseverance will tip the scales in your favour. It is necessary to get rid of one misconception. *Slimming foods do not exist.* It is arrant nonsense to say that certain foods will make you thin. All foods supply energy; some more than others. Some foods, in fact, are more fattening than others. Look, for example, at the calories obtained from bread and butter, and from puddings and roast beef. One thing you can be sure of—if you starve you will lose weight. In his book, *Obesity*, Dr W. F. Christie says of bread: 'This staple article of diet is probably more responsible for over-fatness than any other single item of food.'

In reducing your weight to its optimum level you should begin by diminishing the consumption of fat. Bacon, ham, pork sausages, fat, mutton, and fried dishes are rich in fat, and have a high calorie value. If you have two rashers of bacon for breakfast cut it down to one. Eat boiled fish instead of fried. Avoid the fat in meat and eat the lean. Spread the butter a little more thinly on the bread. If your corpulency is gross you will have to take your courage in both hands, and develop an abhorrence for the succulent dishes that formerly delighted you. The way of a transgressor is hard. But it is important to keep an eye on the fat-soluble vitamins A and D, and it would be wise to swallow capsules which supply these in a concentrated form.

Having made headway with the fats, you should then make a frontal attack on the carbohydrates, bearing in mind the unkind things that have already been said about refined

sugar and refined flour. The crisp breakfast cereal smothered in sugar had better be abandoned at once, and the milk drunk neat. Three lumps of sugar in the tea should be reduced to one, or, better, replaced by saccharin. If you have potatoes at lunch and dinner, avoid playing about with a piece of bread at the same time. Thickened soups and sauces should be shunned. Cakes and biscuits for tea may be all right for children, but they are not the stuff for grown men. But if the carbohydrates are too rigidly reduced you may feel miserable, tired, and hungry; so proceed gradually.

As you are no longer a mighty hunter you may next tackle the meat question. The fat meats already mentioned should be left well alone. Chicken, especially the white part, contains less fat than beef or mutton. If you have bacon for breakfast, a chop for lunch, and a joint in the evening, you are carrying things too far. You do not need three meat meals a day.

The remedy for obesity, you see, is simple. Eat less of everything, especially of foods of high calorie value. But do not delude yourself that this is going to be easy. Old habits are not easily displaced. The feeling of gastric comfort that comes from mass may be satisfied by eating fruit and green leaf vegetables. These, too, will satisfy the need of the large intestine to have something to work upon. Above all avoid stunt diets and slimming tablets, and if you are in the Daniel Lambert class and past middle-age you should put yourself in the merciful hands of your doctor. Be content to lose about 7 or 8 lb. a month, and when you are down to the optimum level stay there. The increased feeling of well-being and the greater mental alertness will be sufficient encouragement. Do not forget that slimming is not only a question of eating less at meal-times; it means eating nothing at all between meals—so no sweets and no chocolates. Don't deceive your conscience by becoming a secret eater—by starving at meal-times and guzzling sweets in the cinema. You will, too, have to cut down alcohol, as this provides energy and so spares the foodstuffs. A pint of mild ale yields 244 calories; a pint of old ale 483.

You will get some idea of the calorie value of various foods from the table below.

2 oz. of	*Calories*
golden syrup yields	204
apple	20½
orange	22½
average brown bread	136
cheddar cheese	210
herring	112
steamed plaice	50
steamed sole	41
fat bacon, fried	320
roast beef	201
kidneys	87
roast lamb	116
liver, cooked	141
stewed rabbit	89
chicken, roast or boiled	103

Having reduced your intake of energy, the next step is to increase the output. And the obvious way is to take more exercise. This, especially for the middle-aged man and the very fat, must be done gradually and should be preceded by an overhaul by the family doctor. An obese person probably has an obese heart, and this is not to be trifled with. Apart from this, the danger of embarking suddenly upon a strenuous course of exercise is that the appetite receives such a stimulus that more energy may then be taken in than has been given out. This danger must be guarded against. If you have the strength of mind to rise half an hour earlier in the morning you can begin by walking part of the way to work. Walking, riding, and swimming are the best forms of exercise for developing the muscles of the body in a harmonious fashion. Golf is a good excuse for walking, and the worse you are the more you walk and swing, so don't worry about the handicap. You should deny yourself that pleasant nap in an arm-chair on Sunday afternoon, for during sleep the expenditure of energy is at a very low level. There is the garden to be weeded, the latch on the gate to be repaired, and the National Gallery to be visited. Be a busybody and ignore the consequences.

12. THE THIN END OF THE WEDGE

> Some again are in the other extreme, and draw this mischief on their heads by too ceremonious and strict diet, being over-precise, cockney-like, and curious in their observations of meats. . . .
>
> *The Anatomy of Melancholy*, BURTON.

IT is as unwise to be too thin as it is to be too fat, and the slimming indulged in by young women cannot be too strongly deplored. Better to be like one of Rubens's young ladies than like the Botticelli Venus. The craze for angularity and scragginess may be an expression of the masculine protest the psychologists speak about. Maybe the young men of the city have forgotten the line of a popular song which said: 'When a pullet is plump it is tender.' Whatever the cause, the young women who try to turn nature out with a knife and fork will rue the day they did it. It has been suggested that the prevalence of tuberculosis of the lung in young women is in part due to their abominable dietetic habits. Whether this be so or not, it is true that under-nutrition and tuberculosis go hand in hand. Therefore, maidens, brush up your health by attaining your optimum weight and don't go below it. One film star at least has gained an international reputation from the magnificence of her curves.

13. GETTING RID OF THE WASTE

> 'Whosoever takes much physic in his youth, shall soon bewail it in his old age,' purgative physic especially, which doth much debilitate nature.
>
> *The Anatomy of Melancholy*, BURTON.

I remember reading in a French newspaper an advertisement for a laxative which ran in large block capitals thus:

'*La constipation abrège la vie.*' This was the despairing cry of a suffering, sedentary, and costive humanity, perhaps of an envious and greedy humanity which says: 'What I have I hold.' Opposite are some extracts of advertisements for laxatives and remedies for indigestion appearing in our own daily press. They bear eloquent testimony to the sad state we are all in.

Constipation is not a subject discussed in polite circles, because for some reason or other the excretory functions of the body are looked upon as undignified. This attitude was expressed by Swift in the poem he wrote about Celia. Getting rid of waste products is a natural and essential duty of the body. If they are not disposed of at regular intervals dullness of mind, headaches, vague aches and pains, and other troubles will follow.

This is not the place to go into the varieties of constipation, but a word may be said about constipation suddenly appearing in a middle-aged or elderly person whose habits have previously been normal. It may be of no significance, but it may also mean that some obstruction has occurred in the bowel. A visit to the family doctor is imperative, for this will give him the chance of treating the cause of the obstruction at an early stage.

If you are constipated begin the cure by stopping dosing yourself with patent medicines and purgative salts. Most of these irritate the bowel and increase the tendency to constipation. You don't need medicines to help you to breathe; so why plague your bowel when it is trying to carry out its natural duties. As often as not constipation is due to faulty habits. It is essential to pay a visit to the w.c. at the same time each day, and custom has sanctioned the interval after breakfast and before work. If you get up late, scramble through your breakfast, and barely leave time to catch the train or bus, then you cannot expect your colon to proceed with its allotted task. This disordered routine is, I believe, half the trouble with most costive folk. Having, so to speak, missed the bus, they try to remedy matters by swallowing pills which have made fortunes for men astute enough to coin money out of other people's folly. In the end the

NONSENSE! I'VE TRIED EVERYTHING. YOU CAN'T TELL ME A FOOD WILL GET RID OF THIS AWFUL CONSTIPATION!

Again, doctors and nurses will always recommend this liquid laxative because you can measure the dose to a drop to suit the patient's system and also diminish it as the bowels begin to act naturally. You can't do this with rough-and-ready doses like pills, tablets, sweets, etc., which leave the bowels worse bound than ever and often start a life-long aperient habit. Spare your family this affliction.

The liver should pour out two pints of liquid bile into your bowels daily. If this bile is not flowing freely, your food does not digest. It just decays in the bowels. Gas bloats up your stomach. You get constipated. Your system is poisoned, you feel sunk, world looks punk.

Gently, safely, they cleared away clogging wastes, purified his blood, sharpened his appetite. Now he eats like a boy! He's ready for fun!

To get a clear, beautiful complexion again, you must cleanse this network of blood-vessels in your skin *from inside* —by driving out the impurities from the bloodstream itself. Ordinary laxatives cannot do this, because they merely empty the intestines. They cannot cleanse the blood-stream, for the simple reason that *they cannot reach it.*

If you spilled your concentrated STOMACH ACID on to a CARPET you would BURN A HOLE THE SIZE OF A SAUCER!

A WELL-KNOWN London Chemist has brought years of research and experiment to a triumphant conclusion by an amazing discovery which affords every sufferer from Hæmorrhoids or Constipation the blessing of immediate relief, and complete banishment of this distressing condition to which 70 per cent of the adult population is subject.

Do you find you cannot eat without getting filled with flatulence? That is because acid turns your food into a tough mass. Your stomach struggles with every mouthful. Take . . . you'll have no more mealtime misery.

Under normal conditions you never think of the process we call digestion. It is when gastritis or dyspepsia comes, that you realize what it really means.

For INNER cleanliness be REGULAR with your . . . . . Working hand in hand with Nature, ... gives complete clearance of the bowels. Moreover it does this gently, without increasing the dose.

pills aggravate the condition they are supposed to cure. And so more pills are necessary. Regular habit is the first step to salvation, but you should not ignore the call of the colon at any time during the day, however embarrassing this may be.

You have probably heard of roughage, a term applied to stuff in food that cannot be absorbed—the cellulose of vegetables, for example. The colon needs roughage to stimulate it to work. Brown bread, fruit, and vegetables supply the roughage, and you should by now have included a sufficiency of these in your diet. They may be supplemented by bran. A glass of water first thing in the morning also helps. For a constipated child extra orange juice often does the trick.

If your ordinary muscles are flabby and of poor tone it is not improbable that the muscles of your gut will be in the same condition. General exercise of the body will help to put this right. This can be supplemented by special exercises for the abdomen and the muscles of the pelvis, such as those described by Mr Hornibrook in his book, *Culture of the Abdomen.* The process of defaecation has not been made easier by the modern sanitary engineer, and however good one's muscles the act has to be performed in a position of maximum mechanical disadvantage. The modern w.c. is made for man, but man was not made for it. In the pre-sanitary (and admittedly unhygienic) period he sank naturally into a squatting position. With the development of civilization he has had to perch himself ever higher and more precariously. The strain of this state of suspension may be relieved by placing a box beneath the toilet apparatus, on which the feet may rest, thus restoring to some extent the natural posture.

If you follow the above régime you will be a happier and healthier person, and will spend less at the chemist than you used to. If in spite of everything all fails, then you should ask your doctor what else to do, and he will advise you what drugs may be necessary.

14. GRAPE JUICE

The thinnest, whitest, smallest wine is best, not thick, nor strong; and so of beer, the middling is fittest.

The Anatomy of Melancholy, BURTON.

THE accusation has been levelled at the medical profession that its members are not anxious to investigate too closely the effects upon the body of alcohol and tobacco for the reason that, with the generality of mankind, they look with favour on these softeners of human intercourse. This is not altogether true. But much emotion has certainly entered into writings and discourses on the subject. The rabid teetotaller has often spoilt his case by overstatement, and it is from him that one has come to expect bias rather than from the moderate addict. As a moderate addict I have a bias towards retaining the social customs of smoking and drinking, so you must discount that much from what follows. Perhaps one should stress these habits as *social* habits. Their chief merit and justification is that they promote enjoyment of the company of others. When indulged in alone they become dangerous; especially is this so with alcohol.

THESE HABITS PROMOTE ENJOYMENT OF THE COMPANY OF OTHERS

The drinking of wine is a very ancient custom, bound up with tradition and religious ceremonial. How unwise it is to tamper with a usage so closely woven into the fabric of human society was shown by the American experiment in

total prohibition. The word 'pussyfoot' is probably now unknown to a great many people. Wine should be treated with respect, and not as alcohol. The abuse comes with loss of respect. And so it always has been. 'The sons of Belial, flown with insolence and wine,' wrote Milton. Burton described wine as one of the 'two maine plagues and common dotages of humane kind.' And things have come to such a pass these days that insurance companies would be happier if their policy-holders were all teetotallers. An actuary of the New York Life Insurance Company stated that 'total abstainers have a mortality during the working years of life of about one-half that among those who use alcohol to the extent of at least two glasses of whisky daily.' It is not stated what the size of the glass was. The brewers believe that beer is best. Doctors themselves dispute the value of alcohol in the treatment of disease. What are you, who are neither ill nor a son of Belial, to do about it?

If you are an abstainer, you will continue to abstain; if you enjoy a talk across the walnuts and the wine, whatever may be said here will not put you off your stroke. I have sympathy with Rabelais's remark that 'the soul never dwells in a dry place, drought kills it,' and would therefore say as much as possible in favour of moderate drinking, without, however, pretending that physical health would not be better without it. Alcohol is an obvious danger when it becomes a necessity to existence. The motorist whose judgment is impaired by drink is a risk to others as well as to himself. Alcoholic excess is to be condemned, as are excessive tea-drinking and smoking. The wise man will take alcohol only with his food, for it stimulates the secretion of gastric juice and increases the vigour of the movements of the stomach. Neat spirits, however, have a bad effect on the empty stomach and induce catarrh in it, so the frequenter of cocktail parties should beware.

Alcohol undergoes complete combustion in the body, and so yields energy and heat to it, 1 gramme providing 7 calories. Alcohol is, therefore, to this extent, a food, and owing to the fact that it passes straight into the blood without any need of digestion it is a useful way of giving

energy quickly to the exhausted and the fatigued. It stimulates the heart, but this effect is only temporary, and depression follows. In old age alcohol is of value as a digestive stimulant. A learned physician has recommended stout for insomnia; he said: 'I scarcely ever met with a man who could withstand the soporific effects of bottled stout. It is far better than opium, and induces a more nearly natural sleep.'

But it cannot be denied that alcohol has a poisonous effect on the stuff of life called protoplasm. The cells of the brain are peculiarly susceptible to its paralysing influence, an influence which in minor degrees makes the other fellow's conversation and presence to some extent tolerable. Another of its actions is to dilate the blood-vessels of the skin, which causes the body to lose heat. Alcohol, therefore, does not keep out the cold, but lets out the heat, a fact that was bitterly appreciated by members of an Alpine party who had to spend the night at a high altitude after a hard day's climb. Referring to this incident, Dr Kenelm Winslow writes: 'In the morning those who had refrained from alcohol awoke refreshed and well, those who had taken a small amount of alcohol found themselves cold and wretched, while those who had indulged freely did not awake at all, because they were dead.' If you feel cold, then, don't take a glass of brandy until you are safely indoors and prepared to stay in.

By its immediate combustion alcohol saves the body the trouble of using fat and carbohydrate, especially the former. In fact, it interferes with the body cell's capacity for breaking down fat. Fat then accumulates and the obese person will not get his weight down unless he restricts his consumption of beer, wines, and spirits.

On balance, alcohol does not come out very well from this brief inquiry into the part it plays in the human economy. The story of the Alpine climbers and the gloomy conclusion of the New York actuary are not encouraging. But other statisticians have come to the rescue with a piece of good news for the sons of Belial. According to the American workers, Stockard and Raymond Pearl, alcohol may be of

eugenic significance. Stockard concluded that nations which have imbibed alcohol through many generations have accomplished more than nations which have been more abstemious. Whisky, it must be remembered, is the Scottish national drink. Raymond Pearl says: 'This beneficial effect [of alcohol upon the race] appears to be produced chiefly as a result of the remarkably sharp and precise selective action of this agent [alcohol] upon germ-cells and developing embryos, killing off the weak and defective and leaving the strong and sound to survive and perpetuate the race.' Perhaps the learned Dr Rabelais knew this when he wrote: 'Our fathers drank lustily, and emptied their cans. . . . Come let us drink.'

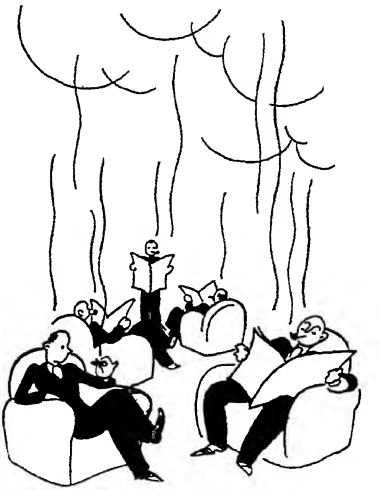
15. THE UNHOLY HERB

> . . . But as it is commonly abused by most men, which take it as tinkers do ale, 'tis a plague, a mischief, a violent purger of goods, lands, health; hellish, devilish, and damned tobacco, the ruin and overthrow of body and soul.
>
> *The Anatomy of Melancholy*, BURTON.

EVER since Sir Walter Raleigh took a pipe of tobacco on his way to the scaffold 'our holy herb nicotian' has flourished like a weed and spread its delectable fumes over the face of the earth. Only the strong-minded or the weak-stomached can resist it. In the green days of its youth as a narcotic to be inhaled it was credited with miraculous healing powers and called 'herba panacea,' 'divine tobacco.' This may have been because Catherine de Medici, to whom Jean Nicot sent seeds of the tobacco plant from Portugal, did not live long enough to discover its poisonous properties. Nicotine is a strong poison; physiologists have utilized its paralysing effect on cells of the involuntary nervous system in their researches. There are other noxious substances in tobacco smoke besides nicotine, such as pyridine, ammonia gas, and carbon monoxide.

Many workers have investigated the reactions of smokers, but so far as I know no one has yet shown that tobacco has any virtue. One expert has even declared that tobacco has done more harm than alcohol, cocaine, and opium combined. This seems to me, a consistent smoker, a somewhat jaundiced view.

Smoking irritates the tongue, the throat, and the respiratory passages. It makes you cough. It dulls the palate and renders it insensitive to the subtle flavours of the fermented grape. It upsets digestion, and patients with duodenal ulcer are usually warned by their doctors to cut down smoking. Smoking sends up your blood-pressure and quickens the pulse; it cuts short the breath, sometimes brings on a headache, and in the very young gives a pale green cast to the countenance and raises beads of cold sweat upon the brow. It constricts the blood-vessels of the skin and lowers the surface temperature of the body. Numerous observations show that it diminishes efficiency and interferes with precision of movement. The late Dr W. H. Rivers, examining the effect of smoking, wrote: 'We thus see that tobacco comes out from the ergographic test less creditably than the other drugs we have been considering . . . the prohibition of this substance during training of feats involving muscular activity seems to show that this depressing action on the strength of muscular contraction has been recognized by general experience.'



IT DIMINISHES EFFICIENCY AND INTERFERES WITH PRECISION OF MOVEMENT

And yet, in spite of all this, the consumption of tobacco goes up and up. In the past ten years the consumption of

Empire tobacco leaf has increased at the rate of 2,000,000 lb. a year. For twenty-five years before 1933 the expenditure of tobacco increased annually by about £1,000,000. From 1933 to 1937 the total rose from £120,000,000 to £150,000,000. Of course, if as a nation we are prepared to spend this on a pretty poisonous narcotic we really can't grumble at the income tax. Its gentle narcotizing influence perhaps makes it more possible to put up with the racket of modern life. A long puff at a pipe or cigarette often gives one time to reflect upon the intentions of the adversary at the gate before committing oneself to decisions that may later prove unwise. The offer of a cigar may turn the course of an awkward conversation. Perhaps, too, there is some elemental comfort to be derived from sucking at the chewed mouthpiece of a pipe even though its contents stink to heaven.

But if you are out to be 100 per cent fit you should put tobacco on the black list. If you are content to brush up your health just enough to make it look respectable you should reduce the number of cigarettes to, say, ten a day. Unfortunately, it appears to be easier to give up smoking altogether than to exercise moderation. The path of virtue is not strewn with primroses, and if you wish to reform I would suggest that you begin by convincing yourself that you really dislike smoking. Don't tantalize yourself with smoke-laden dreams; they will only, in the long run, lead you more swiftly down the path of destruction. Persuade yourself, in the words of King James I, that smoking is 'a custom loathsome to the eye, hateful to the nose, harmful to the brain, dangerous to the lungs, and in the black stinking fume thereof nearest resembling the horrible stygian smoke of the bottomless pit.'

16. SEE TO IT

Of these five senses, sight is held to be most precious, and the best. . .

The Anatomy of Melancholy, BURTON.

YOU have probably noticed one obvious omission in the catalogue of the misdeeds of the holy herb—blindness. If you smoke too much you run the risk of what is politely called tobacco amblyopia. To begin with, a cloud will appear before your eyes in the direction you are trying to look. Although much smaller than a man's hand the appearance of this cloud is an ominous sign, and you should not have to wait for your doctor to tell you to give up smoking. Then your ability to recognize colours is interfered with. But I will not further harrow up thy soul with fearful tales of what tobacco may do!

The blindness, by the way, clears up when the habit is abandoned. That so many of us are prepared to run the risk of harming the most precious of the special senses shows how stupid we may become through habit, imitation, or indifference to the fate of the body. You have, for example, probably not had your eyes tested since the eye specialist prescribed glasses for you about five years ago. They may need changing now. The eyes often flash a warning signal for other parts of the body. Disturbances of the eye may inform the physician that his patient is suffering from nephritis, diabetes, high blood-pressure, tumour of the brain, and various nervous diseases. That is why it is so important to seek the advice of an eye specialist who is medically qualified—an ophthalmologist—in preference to an optician, who is not a medical man.

Better still go to your doctor before your eyes bother you; he may be able to forestall disaster. If this is too late for yourself you can at least arrange matters better for your

This type may be used for books to be read by children under seven.

This type may be used for books to be read by children from seven to eight years old.

This type is suitable in size for books to be read by children from eight to nine years old.

This type is suitable in size for books intended for readers over nine years old.

This type is suitable in size for books intended for practised readers over twelve years old.

child. The child's eye grows with the rest of the body. Like the body it is immature and must not be strained unduly. Its highly specialized nature makes it more susceptible to strain and more easily damaged than muscle and bone. Much more than these does it need rest; yet a sick child is allowed to 'devour' books while lying in bed in a position that would strain the eyes of an adult. Prolonged

close work; reading, writing, sewing, in a bad light; the use of improper materials (e.g. books printed in too small a type —the worst printed book in the world from this point of view being the Bible); 'eye work' in any condition of ill-health—all will tend to produce eye-strain, squint, short-sightedness, and mental fatigue. The expression on your child's face will tell you whether he or she is suffering from eye-strain: a worried, strained expression; a perpetual frown; excessive blinking; red and tired eyes. There may be complaint of headaches.

If the child holds the book too close to the eyes when he reads it is probable that he is short-sighted. Children are not born short-sighted, although they may be born long-sighted. Short-sightedness is rare before the age of five years, before, that is, the age at which a child goes to school. Then the trouble begins for those who have a hereditary tendency to myopia, as short-sightedness is called. Myopia, then, usually starts during school life and tends to increase with each year of growth. The eyeball is, so to speak, stretched; it becomes elongated instead of spherical, so that images of objects fall short of the retina at the back of the eyeball. The two important factors in the production of myopia are near work and the stooping position. These must be avoided. At home you can prevent the child curling up in a badly lighted corner of the room with his eyes glued to a badly-printed book. And if you weren't so lazy you would read aloud to him. Opposite are the sizes of type for different ages recommended by a committee of the British Association for the Advancement of Science.

The book should be held at an angle of 60° with the horizontal and at a distance of 12 inches or more from the eyes. The desk or table should not be too high for the child. In his book, *The Eyes of Our Children*, Mr Bishop Harman writes: 'All pens, copy-books, slates, and pencils should be banished from the infants' school. The initial lessons in writing should be made with the finger on the sand-tray.'

No child should be allowed to sew before the age of seven years, for she seems to be quite incapable of keeping her eyes at a safe distance from the work she is sewing. And

when she does begin she should not be permitted to sew in artificial light. Knitting is simpler and safer for the eyes. Reading or sewing continued to the point of fatigue is bad for any one, and short periods of rest and relaxation are essential for the child. Looking at objects fifteen or twenty feet away gives complete relaxation to the eyes. Mr Harman points out that reading in the standing position is good because when the legs get tired of supporting the body it is a sure sign that the eyes should stop reading.

Adequate lighting is, of course, of the greatest importance. And 'adequate' does not mean a blazing glare. Bad illumination in a classroom may help to spoil a child's eyes for life; and what is bad for the child is bad for the adult. Nevertheless many people seem to be content to work and to read under the worst possible conditions of lighting in offices and in private houses. (The word light should be taken to mean artificial light, unless otherwise stated.)

For writing, the light should come from the left and from behind for right-handed people, so as to avoid the shadow of the hand being thrown across the paper.

For reading, too, and many other occupations in which eyes play a large part, the light should come from behind and from one side, and should never shine in the eyes of the worker or reader. In all work demanding the continued use of the eyes—such as sewing, type-setting, typewriting, etc.—extra illumination of the field of work is needed, and this should be more intense than the lighting in the rest of the room. The latter, however, is essential, and it is a bad practice, for example, to work with a reading lamp on the desk and the rest of the room in darkness. It is also bad if the light in the rest of the room is brighter than the light on the work. All visible sources of illumination should be shaded, and the most satisfactory method of lighting is to diffuse it by reflection from walls and ceilings. With direct light glare is sometimes difficult to eliminate, and glare is the enemy of good eyesight. Dark furniture and dark walls will absorb light and give uncomfortable contrasts to a room. Light walls will diffuse light. Glossy surfaces should be avoided.

Insufficient light has been the cause of much harm and much inefficiency. The Washington Public Health Department, investigating the eyes of employees who worked in the old poorly-lit City Hall post office and those of workers in the more modern better lit offices, found a greater number of abnormalities (such as errors of refraction) in the former: the average difference in illumination in the two groups of offices was as 3 to 5 foot-candles. When the light in the Chicago post offices was increased from 2¼ to 9 foot-candles the output of mail sorted per man per hour went up from 28 lb. to 33 lb. Elimination of glare and of sharp shadows in a plant making infant's hosiery raised the production on the knitting machines by 10·6 per cent. In another investigation it was found that 12 per cent more work was done when there was no brightness contrast between the task and the rest of the room. These facts show how important the matter is.

All this does not mean that you must have the brightest lamps possible. Too much light is as bad as too little. You must, however, have enough. If in doubt you can have the intensity of illumination measured by a photometer. One authority recommends that for reading ordinary print—e.g. this book—the intensity of light should be about 10 foot-candles, and that for poor print or print on poor paper (e.g. telephone directory) 20 foot-candles should be used. Fine, close work needs stronger illumination than ordinary work. Old eyes need more light than young ones.

17. THE ROOTS OF DECAY

Moreover, that which he doth eat must be well chewed. . . .
The Anatomy of Melancholy, BURTON.

NOT so long ago a medical man came to the startling conclusion that brushing the teeth is of no use in the prevention of caries, and is even harmful. The brushing, he said, caused

retraction of the gums, and tooth-pastes containing soaps made the necks of teeth decay. I know that most (if not all) of my acquaintances and friends clean their teeth with monotonous regularity, and know, too, that many of them have had carious teeth. Nor am I aware that brushing teeth systematically for a number of years has done me much good. Whenever I go to the dentist he invariably finds a tooth that needs filling. Nevertheless I feel inclined to agree with Professor E. A. Hooton of Harvard University that 'brushing the teeth is like buttering the baby's heel; it cannot do any harm, and it may do some good.'

Our teeth, however, are in a pretty bad way, and it would seem only common sense to connect this with the stuff we take into our mouths—the food we eat and the way we eat it. Mrs (now Lady) Mellanby showed that sufficiency of calcium salts and vitamin D in the diet are essential for the proper development of the teeth, and that a tooth with an imperfect structure due to lack of these was liable to decay. Mrs Mellanby also found that cereals had, so to speak, a nullifying effect on vitamin D. For the prevention of caries she advised, therefore, food supplies of vitamin D and calcium-containing foods and a restriction of cereals. Workers in South Africa have 'incubated' teeth in mixtures containing saliva and sugar or cereals. They found that refined sugar and refined flour made a large proportion of the incubated teeth lose their calcium (decalcify). When the teeth were incubated with crude cane juice very few of them underwent decalcification. It has been shown that the South African Bantu are relatively free from dental caries while living under primitive Kraal conditions, but that the teeth decay as the Bantu adopt European ways of living—and the guilt here is again laid at the door of refined flour and refined sugar. There is no doubt that a sweet tooth soon rots, and however hard you brush the teeth they will decay on an unsuitable diet. You can of course help matters by seeing that food—especially carbohydrates—does not get stuck between the teeth, there to produce acids. I personally think that a tooth-pick is more serviceable than a tooth-brush for clearing purposes. A certain amount of skill is

necessary in getting the maximum value out of a tooth-pick, but, although a sporting implement, its entertainment value is not high.

The teeth must be exercised, and so must the jaws, if both are to develop properly. The apple is a convenient excuse. Man as a species ought soon to make up his mind whether he wants to keep his teeth and his lower jaw, which seems to be beating a steady retreat from one generation to another. But as he is unlikely to alter his ways he must resign himself to a lot of dental discomfort in the form of crowded teeth, unerupted teeth, and sets of teeth that won't meet properly when the mouth is shut. The dentist's bill, however, would be less if we paid more attention to what we eat. It is perhaps not necessary to add that in any case you should visit your dentist regularly, so that he may repair in time the ravages wrought in your mouth by your own folly.

18. ON BRINGING UP YOUR CHILDREN

To come nearer yet, our own parents by their offences, indiscretion, and intemperance, are our mortal enemies. . . .
The Anatomy of Melancholy, BURTON.

THE child is nowadays getting all the attention usually devoted to a rare object. The falling birth-rate has indeed increased the value of each child to the community, and in the smaller family the boy or girl receives more care than he or she would if one of six or seven. In the days of Queen Anne a certain amount of wastage did not matter so much.

It has become a commonplace to say that we live in a neurotic age, and it is now a matter of common knowledge that the seeds of neurosis are sown in childhood. Therefore the upbringing of children is now more important than ever. There are of course over-enthusiastic advocates of this and that system of life for the man and the woman of the future.

Many of these systems are quite unrelated to the realities either of the immediate environment of the child or of the world into which he will enter as an adult.

There are a lot of half-baked ideas in the air based upon half-knowledge of the findings of modern psychology. Parents spend sleepless nights wondering whether their child has caught one of the latest complexes, thereby fretting their own nerves and creating an unstable environment for the young hopeful. They mistake the natural shy period through which every child passes as evidence of an inferiority complex. They talk anxiously with neighbours on the dangers of inhibition, and discuss in awed whispers the funny things psychologists say about erotic zones.

IT IS A GOOD THING THEY SHOULD TAKE THEIR JOB SERIOUSLY

This activity on the part of parents is not necessarily to be decried. It is a good thing they should take their job seriously; and a good thing they should try to find out what help psychology can give them. But if this pursuit of knowledge is going to make the parent anxious about his or her child, the child will suffer, because he will respond like wax to a flame to the mood of his mother or father. The other danger is that a little learning will tempt the parent to diagnose the causes of her child's waywardness and to prescribe a course of treatment. This way lies disaster. The value to the parent of some knowledge of psychology is that she will be able to understand better what her child is getting at. The fuller the understanding the more sympathetic and natural will be the reaction of the parent to her child's psychological growing pains. Fundamentally, the parents' task is simple. Simple, that is, in conception, but difficult to carry out for many because of material circumstances and

individual difficulties of character. Children may be little devils, but I have yet to meet the father or mother who is a saint, for 'men are but children of a larger growth.'

The progress of the young human animal from a state of complete helplessness to some form of independence needs for its ease of passage a condition of neutrality on the part of those bringing him up. By neutrality I do not mean indifference. I mean tolerance, sympathy, love. In his early days the child is desperately insecure. So long as he can fortify himself from a steady reservoir of parental affection he will gain the security he needs. If there is parental strife the waters of the child's psyche will be troubled. Neutrality means, too, non-intervention. The child must not be smothered with love: you can have too much of a good thing. He must not be pampered and pandered to. The care which killed the cat is obviously not going to do the child much good. The parents' job, as I see it, is to form a steady affectionate background to the child's life, and to stand aside so as to let him develop in his own way unhindered by too much direction as to where he should go. Independence has to be fostered at each step. If a child shows a tendency to do some new thing for himself, encourage him. The parent should intervene only to avert danger.

I disagree, however, with those who would (and do) allow a child to do just what he wants when and where he wants it. Civilization is built on inhibitions, and modern society involves certain restrictions on behaviour. The child has to be introduced gradually to these restrictions, or he will grow up to believe that society is based on anarchic principles. (I admit that someone might retort here: 'Well, so it is.') Obviously the child should not be allowed to smash the best china. He must be discouraged from being cruel to other children—and in my own limited experience I have been astonished at the homicidal intensity with which children can attack each other.

This brings up the question of what form the discouragement should take. The burning question with many parents is: 'Should I smack him when he's naughty?' What is interesting to the listener-in to these parental conversations

is the amount of emotion displayed. A mother or father who will be quite indifferent whether the milk little Johnnie is drinking is pasteurized or raw (although the latter may give him typhoid, tuberculosis, scarlet fever, diphtheria, or a sore throat) will become a passionate advocate of the benefits of corporal punishment. The parent behaves as though he were being denied his natural right if it is suggested that hitting or smacking a child is not a good thing. And he rarely wants to consider whether there is any other method of dealing with a refractory son or daughter. Display of anger and violence is a breakdown of neutrality, a disturbance of peaceful relations. True the child has begun it; but where can he learn wisdom if not from his parents? And is it not wisdom to seek peace and ensue it? Once sanction violence by using it yourself and a destructive element is introduced into the relations between your child and you. He will learn the lesson right enough, and in imagination arm himself for future conflicts. If he cannot work off his accumulated aggression on outside persons or objects he will turn it against himself. On the other hand excessive moralizing, with stress upon wrong-doing, will do as much if not more harm than a quick slap. To convict a child too strongly of his misdeed intensifies his sense of guilt and puts too great a strain on his sense of moral responsibility.

One of the most difficult tasks a child has in growing up is to learn how to handle his aggressive impulses. Growing up is to accept disillusionment with equanimity, to postpone the fulfilment of pleasure. The process of weaning is the first thwarting the child undergoes. That he will suck anything he can get hold of shows that sucking in itself is a pleasurable activity and not one that is used solely for taking nourishment. It is therefore not unlikely that he will feel annoyed with the person who has deprived him of his means of satisfaction. Early manifestations of hostility against the mother are then not surprising. The child, so to speak, sidetracks some of his aggression by attributing it to the parent against whom his hostility is directed. The parent then becomes a threatening hostile object, as well as a

depriving object. Psychologists believe that a child forms in his mind a fantasied picture of his father and mother alongside the real picture. This picture—none the less real to the child because it is fantasy—has continually to be tested against the flesh-and-blood actuality. It will depend to a large extent upon you how indelibly the fantasy picture will be printed on the child's mind. If your son or daughter imagines you to be a bogyman and you behave like one, then their approach to you will be guarded and their love for you, and your love for them, will have an element of fear and anxiety in it.

The wish of the child to retaliate against the parent for a real or imagined injury has to be stifled either because the parent is (to the child) obviously too powerful or because the child's developing conscience forbids him. The emotional conflict may become acute and be expressed as a general anxiety or an undue anxiety about a particular set of circumstances. The condemnation by conscience of the retaliatory wish will give rise to feelings of guilt. Guilt and anxiety may wring havoc with a child's psyche, and if they become prominent then the advice of a doctor should be sought: they should not be ignored as of no account.

The child's character is based upon the conceptions of his parents he builds into his mental structure: against these conceptions will he measure the rest of the world. It is, therefore, important to preserve strictly an attitude of friendly neutrality. The child may batter against it, intrigue against it, strive by hook and by crook to make a breach of the peace; but if you are consistent he will end up by saying with 'Brer Rabbit': 'I 'm blowed if it ain't sparrow-grass.' There is no force in the world stronger than the force of example.

The shifting loyalties within the family group show to any one who wishes to observe the conflicting emotions that go on in the child's mind. To the son who is perhaps unduly attached to the mother the father is a powerful rival: if the father is easily moved to anger and violence the son will find it so much the more difficult to adjust himself to a situation which becomes increasingly fraught with danger. (Violence

is a strong word, and applies to the meaning the child will attach to a smack or whipping. When a friendly dog playfully snaps at a child for the first time the child is terrified: when it does so 'in earnest' that 's an end to the relationship between the two.) The jealousy of a child when a new baby arrives on the scene may be so intense as to make the child ill. The little child is a passionate creature with his emotions concentrated in the family circle. The situation needs careful handling. Natural admiration of the new marvel must be tempered in front of the child who once occupied that position himself. The older child must be shown that the parents' love is not exclusive. The girl can be given maternal duties, such as fetching napkins, holding towels, 'helping' to bath the baby, and so forth. Benevolent neutrality is here again the great safeguard.

But benevolent neutrality is not incompatible with the categorical negative. A child must be told that it simply is not done to push plasticine up her baby brother's nose, to upset his pram, and to attempt to scratch his eyes out. She must be taught to respect other people's privileges and liberties, and this can only be effectively done if proper respect is paid to her's. The great mistake is to treat the child as rather a pet, but belonging to quite a different species from oneself. The child always understands twice as much as he is credited with understanding, and is quite prepared to consider and act on alternative lines of action if they are quietly put before him. Too frequent an appeal to the force of parental authority is risky. The word 'don't' tends to become monotonous, and every effort should therefore be made to remove possible causes of prohibitory remarks. *Objets d'art*, for example, are out of place in the nursery, which should contain nothing that might stimulate the remark 'don't touch.' The child wants to touch, to find out, to explore for himself. He wants also plenty of opportunity to exploit the savage in him. If you try to force him into the civilized mould too early either he or the mould will eventually crack.

After weaning the child's first introduction to the ways of society is to learn the need to control the sphincters of his

excretory passages. His first concession to good manners is to become house-trained. From the point of view of the mother and of the nurse the transition from the 'nappy' to the pot stage is a great nuisance if long drawn out. The child who forms clean habits early in his career will mean less work for those looking after him. But I doubt whether the child who is at too early an age a model of behaviour is really a happy one or will develop into a happy adult. It does not really matter if the child is not clean until two years of age, or even later. What does matter is an undue anxiety on the part of the parents that little Willie shall appear more civilized than he really is. It is better to face the fact that little Willie is still a savage, and at the mercy of the impulse of the moment. Another thing that matters is the attitude of the parents to the functions of defaecation and micturition. If they show disgust when little Willie makes a mess on the floor, scold him, and say that his action is dirty and one to be ashamed of, then a conflict is set up in his turbulent little soul that will do him no good. It is not easy for him to detect that his parents' disgust is not at the act but at the place and time of its performance. He may even observe that the disgust *is* directed at the act, and that his parents still carry with them the impression *they* received in *their* childhood. The important thing is that the parents should deal naturally with these events, showing no anxiety or anger when things do not go the way they think they should. And if a child discovers that he can annoy his mother and attract attention by wetting his clothes, then he will not hesitate to use this method of attack when occasion demands. A natural, tolerant, kindly attitude to these natural mishaps will work wonders.

The same with manifestations of sex. There is much talk these days on the question of giving the child instruction on sex matters. The frequent use of the word 'instruction' in this connection is illuminating. There is to my mind much misconception among parents as to what this instruction should be. They feel uncomfortably that they have to teach the child as soon as possible what they vaguely call 'the facts of life,' and fear will mean a description of the

mechanics of sexual intercourse. Now quite evidently a child has no more need to be told about this than about the mechanics of digestion—at least not before he is capable of assimilating the information. He should, however, be given sensible replies to questions born out of natural curiosity. He should, in fact, be given not instruction, but information when he asks for it—and no more than he asks for. The child *is* inquisitive about bodily functions. The small girl is mystified by the anatomical differences of her small brother. The worst thing to do is to regard what are embarrassing questions as naughtiness and to adopt a hush-hush attitude. It is almost as wrong to foist the child off with fantasies and fairy tales. The child wants to have explained in words the facts of excretion and of sex: if his curiosity is not satisfied his mind will brood upon fantastic speculations: give him the freedom that comes from knowledge. The new baby does not arrive in the doctor's black bag, nor does a stork drop it down the chimney—let 's face it!

No girl should enter the difficult time of puberty without being informed of the fact of menstruation. It is better for the boy to be informed unemotionally of the potentialities of his own sex development than that he should rely upon furtive whisperings and smutty tales from other boys. If his parents are adult enough to do this they should not push the job off on to someone else. Nor should they imagine that it is possible for their children to remain in a state of innocence or blissful ignorance. The parent who has persisted in his attitude of benevolent neutrality will find it simpler to deal with this phase of his child's life than he who has been an emotional weathercock.

Although the fundamental social 'fact' of the child's life is the family, he must not be confined too closely within a circle which, however happily filled, must tend to restrict his rapidly swelling ego. Certainly by the age of three years the child needs plenty of contact with other children. A nursery school gives him the ideal opportunity of expanding unhampered by an environment inevitably associated with emotional conflicts. Meeting other children on

a completely neutral ground, learning to play with them on equal terms (no younger or older brother confusing the issue), finding joy in co-operative activity and adventure, joining with them in such co-ordinated movements provided by simple group dances—all this develops the ego in a non-egoistic fashion, and lays the foundation of the child's life as a social being. If in this way the child learns how to make good contact with other children he will have learnt something of great value.

The mental development of the child is of course closely linked with his physical development, and this in turn upon the kind of food he eats. The full use of the muscles of his body in recreative, imaginative, and constructive activities is of the greatest value. Of importance too is the way he stands and walks and sits—in other words, his posture. This will be referred to in more detail later, but here let it be said that physical poise and co-ordinated muscular control aid and abet spiritual harmony and mental balance.

The parent is apt to be disturbed by the various manifestations of sensuality in the child at various stages of his development. So long as these manifestations are not overt, compulsive, excessive, they need cause no alarm. What does cause harm is a harsh, repressive, threatening attitude on the part of the parent when he discovers that his child has found sources of pleasure in his own body. To imbue a child with a sense of sin, to deepen his sense of guilt, by fierce condemnation of what are the child's experiments with his own physiology is a psychological folly that is committed less in these days than it used to be.

It is not, however, to be supposed that naughty children, vicious and unhappy children, are inevitably the result of faulty parental care. All that can be said is that the child who grows up in a home where security and stability are set against a background of kindly tolerance, courtesy, and affection between child and parents, and between the parents themselves, will have a better chance of developing into a normal adult than one who has not such an environment.

19. ON BRINGING UP YOURSELF

> Many men are very testy by nature, apt to mistake, apt to quarrel, apt to provoke and misinterpret to the worst, everything that is said or done, and thereupon heap unto themselves a great deal of trouble, and disquietness to others. . . .
>
> *The Anatomy of Melancholy*, BURTON.

IN an earlier part of this book it was said that it is not part of the doctor's job to prescribe happiness, nor do I wish to appear so presumptuous as to do so. May I, however, assume for the sake of argument that you are not happy; that you feel restless, dissatisfied, perhaps despondent; that you are vaguely anxious about nothing in particular; that you feel ill at ease with yourself and the rest of the world; that you find it difficult to make decisions and to tackle the job that is in hand. One might boil this down and say that the predominant note in your discord is anxiety. If this state of anxiety is so acute as to incapacitate you severely you will need the help of your doctor. If the picture is not black, but only grey in parts, then you can perhaps do something about it by analysing your own life situation in terms of sex, society, and work. Have you a sense of guilt about the first, a jaundiced view of the second, a sense of inadequacy about the third? While your dissatisfaction with life may be the result of insufficient opportunity to exploit your natural and acquired qualities, it may be that these are being strained beyond their resources. You are anxious lest you should fail, and the threat of failure sends you into deep gloom. Is this sense of failure the result of setting yourself too high a standard, so fantastically high that you will be sure of never reaching it? And have you set it thus high so that success (success in your own eyes) may never quite crown your efforts? In this way, have you provided yourself with a perpetual goad and punishment? Your

pleasure is not in an active, thrusting activity towards achievement, but in a painful withdrawing from—sex, society, work. Or isn't it?

Your brow is wrinkled, your shoulders are hunched up, and your muscles taut, ready for fight or flight. You 've got a grievance, in fact, several grievances. You suspect the other fellow of the worst and feel hostile against him. You can't sleep for worrying about this or that. You find yourself listening to the slightest noise and wondering what it is. A cold sweat rings the roots of your hair as you suddenly recollect that you haven't paid the telephone account. The prospect of having to attend an important business meeting fills you with panic. You are obsessed with the most irrational fears. I leave out of account the great state of anxiety you are in about your health; but the barometer is set for foul weather, and if you go on much longer you will take a header into some kind of disaster, physical or mental.

THE PREDOMINANT NOTE IS ANXIETY

What is to be done about it? Perhaps not a great deal without assistance, but yet something—in the way of self-analysis. You might as well begin by working out a balance sheet. On the credit side—so much health, so much education, so much achievement, so much stability, so much happiness, so much ambition, so much leisure, so much cash. On the debit side—so much ill-health, so much ignorance, so much backsliding, so too much ambition (or not enough), so little leisure, so little cash, so much envy, anxiety, and hostility. (You can fill in the obvious gaps.) You may find that you haven't given yourself a moment's rest from the beginning to the end of each week for months; that you

have been on the go 'doing something' all the time; that you have been fretfully anxious not to waste time 'doing nothing'; that you have been desperately afraid of missing something if you relax for a minute; that the pace of modern life has taken your soul along with it and turned it into a whirligig.

Make a practice now of setting aside one hour each day for relaxation and meditation. If necessary lock yourself in a room away from every one else so that you may be free from interruption. Lie flat and relax your muscles. You may find this difficult at first, and will be surprised to find how taut they are. Breathe deeply. Let go of yourself. Then take a look within if you are prepared to stand the shock of an objective investigation. Let the stupid thoughts tumble over themselves in your mind as they clamour for your attention, but however stupid don't ignore them as they may tell you something about yourself you were previously unaware of. And don't hurry to interrupt them or try to explain them away; watch the sequence in as detached a manner as possible—and be prepared for shocks. If you have the courage and the patience to try this experiment you will go a long way towards knowing yourself. And to know yourself is half the game. It is because you do not know yourself that you have got into such a fix.

After a few sessions—once you have got over the strain of being left alone with yourself—you may get on the track of the cause of your anxiety and fears. The cause may lie in some external circumstance which may or may not be easily remedied. It may be that a simple adjustment of your daily regime is required. You may have been working too long and too late, getting insufficient rest and sleep and not enough fresh air and exercise. You may have forgotten to shun ambition for a while under the greenwood tree. If you have no merry note of your own to tune, you perhaps should listen once more to those who have. This is dangerously near to prescribing music as a passport to happiness, but it may assuage the world-weary soul. It is as undesirable to starve the mind as it is to starve the body. You must look to its proper nourishment yourself.

You may find yourself anxious to fasten the cause of your anxiety on to something external to yourself in order to deflect your attention from the cause that lies within. It may not be possible for you to detect this without the aid of someone else, preferably your family doctor, to whom you can talk freely. If your anxiety is related to sex you should certainly do this, as your doctor is the one person who can view the matter objectively.

The one thing to look out for is hostility masked under a multitude of disguises. You cannot forbear, for example, to point out on any and every occasion how wrong the other person is. Finding fault, you persuade yourself, is a painful duty, self-imposed, so that the world may become a little better—or more correct—place than it was. It is astonishing what a sharp eye you have for the deficiencies of others. And how shocked you would be if you were told that this highly moralistic attitude of yours towards others only just stops short of homicide. The petty restrictions you place upon subordinates (often coupled with undue submissiveness to superiors), the little futile acts of so-called discipline to which you subject others (coupled with a lenient attitude to yourself), the childish fits of immature rage over trifles, show, do they not, in what a wasteful way you use your aggressive instincts, and how closely allied you are to hostile action. Marshal your hates and your pet dislikes before your mind; inspect them closely; discover, if you can, why you hate so-and-so, and detest such-and-such a thing—is the expenditure of so much emotional energy really worth it: it leaves you so little for more profitable pursuits.

You are, of course, an over-inhibited and repressed savage. It is really only but a short time ago that you were pursuing your next-cave neighbour with the laudable intention of cracking his head; and there was still the evening meal to kill in order to celebrate the event. Those of us who can afford it hunt foxes and stags, shoot grouse, and go deep-sea fishing. Some of us can only afford an occasional game of billiards and a coconut shy when the annual fair comes round. Knocking people down with high-powered cars is another way of satisfying those aggressive instincts which

served our evolutionary purpose so well, but which now are rather like the tooth of the sabre-toothed tiger. We are trying, not very successfully, to live with less competition and more co-operation.

An emotion well under way needs for its satisfaction expression in muscular activity. Anger should, logically (and psychologically), end up in a well-planted blow. Hate needs a little homicide to keep it quiet. That 's why we shall all sign on for the next war. But in times of peace fear of the police court and fear of losing our jobs (or self-control) compel us to bottle up our savage emotions and deny them a physical outlet: no wonder the bottle often bursts. What has saved this country from some of the grosser forms of aggression seen elsewhere is, I believe, our addiction to ball games. These give us a legitimate excuse to hit something hard and gain applause for doing so. Is not the golf ball a convenient symbol for the head of the man who did you such a dirty deal last week? This may not be so fanciful as it seems. A doctor in charge of a big home for nervous patients once told me that a game of golf soothed them more than any other line of treatment.

Quite apart from the physical benefit of exercise, then, get your body moving in some aggressive game—golf, tennis, hockey, squash rackets. Don't neglect the primitive savage that is part of your make-up: recognize he is there, and use him to your own ends, but don't let him turn the tables on you.

20. TWELVE THOUSAND MILLION CELLS

> . . . hard students are commonly troubled with gouts, catarrhs, rheums, cachexia, bradiopepsia, bad eyes, stone, and colic, crudities, oppilations, vertigo, winds, consumptions, and all such diseases as come by overmuch sitting; they are most part lean, dry, ill-coloured, spend their fortunes, lose their wits, and many times their lives, and all through immoderate pains, and extraordinary studies.
>
> *The Anatomy of Melancholy*, BURTON.

IN *Man the Unknown* Dr Alexis Carrel writes: 'The cerebral substance contains more than twelve thousand millions of

cells. These cells are connected with one another by fibrils, and each fibril possesses several branches. By means of these fibrils, they associate several trillions of times. And this prodigious crowd of tiny individuals and invisible fibrils, despite its undreamed-of complexity, works as if it were essentially one. To observers accustomed to the simplicity of the molecular and atomic worlds the brain appears as an unintelligible and marvellous phenomenon.'

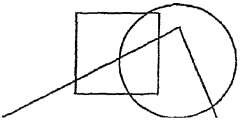
AN INTRICATE MACHINE

An intricate machine this brain of yours, a 'marvellous phenomenon' —so make it less unintelligible. By the courtesy and kindness of Dr Douglas Fryer, and by permission of the publishers, J. B. Lippincott Company of London and Philadelphia, I am allowed to reproduce here the intelligence tests given by Dr Fryer in his book, *Vocational Self-Guidance.* You can test the efficiency of twelve thousand million brain cells, and then decide for yourself whether what is inside your skull really is a marvellous phenomenon. The answers to the tests are at the end of this book.

TEST I

1. Look at these squares. Make a cross in the first square and also a figure one in the last square. *Go!*

2. Look at the diagram below. Make a figure 2 in the space which is in the triangle, but not in the circle or square, and also make a figure 3 in the space which is in the square and circle but not in the triangle. *Go!*



3. Notice the squares below. Put in the third square the right answer to the question: 'How many months has a year?' In the fourth square do nothing, but in the fifth square put any number that is a wrong answer to the question that you have just answered correctly. *Go!*

4. Some of the letters of the alphabet are given below. Cross out the letter just after 'G' and also draw a line under the second letter after 'H.' *Go!*

A B C D E F G H I J K L M N O P

5. Notice the three squares and the three words below. Make in the first square the third letter of the first word; in the second square the first letter of the second word: and in the third square the first letter of the third word. *Go!*

FOREMAN CLERK
MACHINIST

6. Look at the figures below. Draw a line through every even number that is not in a square and also through every odd number that is in a square with a letter. *Go!*

7F

DIRECTIONS

READ CAREFULLY

For all the following tests (Tests 2 to 8) time must be kept *exactly* according to the 'working time' allowed. To secure the best results it is necessary to have someone to call time for you. If you cannot

get any one to time you note on a separate piece of paper the time you must *finish* the test. Should you unintentionally use more time than is allowed make a notation of how much at the bottom of the test.

There will be but one set of directions for each of the following seven tests. If you refer to the directions after commencing work on any test this must be included in the time allowed. You may not be able to finish all the problems of each test but do as many as possible in the time allowed.

Be sure to stop *instantly* when time is up. Read each set of directions slowly and *only once*. Then take account of time and commence work. Read these paragraphs again to be sure you understand the directions.

TEST II

Get the answers to all these problems as quickly as you can. Use the side of the page to figure on if you need to. Notice the two samples which are answered correctly.

Samples.
1. How many are 5 men and 10 men? *Answer* (15)
2. If you walk 4 miles an hour for 3 hours, how far do you walk? *Answer* (12)

Working time: 2½ minutes. *Go!*

1. If you save $4 a month for 9 months, how much will you save? *Answer* ( )
2. Mike had 11 cigars. He bought 3 more and then smoked 8. How many cigars did he have left? *Answer* ( )
3. How many hours will it take a horse to go 48 miles at the rate of 3 miles an hour? *Answer* ( )
4. A truck is driven 400 miles in five days. The first day it is driven 90 miles, the second day 60 miles, the third day 100 miles, the fourth day 70 miles. How many miles was it driven the last day? *Answer* ( )
5. If it takes 5 men 4 days to dig a 200-foot drain, how many men are needed to dig it in half a day? *Answer* ( )
6. A rectangular bin holds 500 cubic feet of lime. If the bin is 10 feet long and 5 feet deep, how wide is it? *Answer* ( )
7. If 5½ tons of bark cost $33, what will 3½ tons cost? *Answer* ( )
8. If an aeroplane goes 300 yards in ten seconds, how many feet does it go in a fifth of a second? *Answer* ( )
9. If 214 men are to dig 5,992 yards of trench, how many yards must be dug by each man? *Answer* ( )
10. A commission house which had already supplied 1897 barrels of apples to Childs' Restaurants delivered the remainder of its stock to 38 branches. Of this remainder each restaurant received 45 barrels. What was the total number of barrels supplied? *Answer* ( )

Notice the questions:

Why do we use stoves? Because:
  They look well.
x They keep us warm.
  They are black.

Here the second answer is the best one and is marked with a cross.

Below are eight questions. Three answers are given to each question. You are to look at the answers carefully; then make a cross in front of the best answer to each question.

Working time: 45 seconds. *Go!*

1. Thermometers are useful because:
   They regulate the temperature.
   They tell us how warm it is.
   They contain mercury.

2. Why ought a grocer to own an automobile? Because:
   If is useful in his business.
   It uses rubber tires.
   It saves railroad fare.

3. Why is the telephone more useful than the telegraph? Because:
   It gets a quicker answer.
   It uses more miles of wire.
   It is a more recent invention.

4. Why is New York larger than Boston? Because:
   It has more railroads.
   It has more millionaires.
   It is better located.

5. Theatres are useful institutions because:
   They employ actors.
   They afford a method of relaxation.
   They give the rich a chance to spend their money.

6. Why is winter colder than summer? Because:
   The sun shines obliquely upon us in winter.
   January is a cold month.
   There is much snow in winter.

7. If a drunken man is quarrelsome and insists on fighting you, it is usually better to:
   Knock him down.
   Call the police.
   Leave him alone.

8. Aeroplanes failed for many years because:
   They were too heavy.
   The materials cost too much.
   The motor was not perfected.

TEST IV

If the two words of the pairs below mean the same draw a line under s a m e. If they are different, draw a line under d i f f e r e n t. If you cannot be sure, guess. The two samples are already marked as they should be.

Samples {good — bad . . . . . same — different
{little — small . . . . . same — different

Working time: 45 seconds. *Go!*

1. slow — fast . . .
2. danger — safety . .
3. choose — select . . ferent
4. similar — different . . different
5. sacred — profane . . different
6. vanity — conceit . . different
7. waste — conserve . . different
8. censure — praise . . different
9. agitate — excite . . different
10. con — pro . . . different
11. conspicuous — prominent different
12. orifice — aperture . . different
13. recline — stand . . different
14. martial — civil . . different
15. torpor — stupor . . different
16. latent — hidden . . different
17. celestial — terrestrial . different
18. urbanity — civility. . different
19. putrid — fetid . . different
20. choleric — phlegmatic . different

TEST V

Notice the two sample sentences:

Samples {a eats cow grass true — false
{horses feathers have all . . true — false

The words a e a t s c o w g r a s s in that order are mixed-up and don't make a sentence, but they would make a sentence if put in the right order: a c o w e a t s g r a s s, and this statement is true.

Again, the words h o r s e s f e a t h e r s h a v e a l l would make a sentence if put in the order a l l h o r s e s h a v e f e a t h e r s, but this statement is false.

Below are twelve mixed-up sentences. When straightened out, some of them are true and some of them are false. Think what each *would* say (but don't write them yourself). Then if what it *would* say is true, draw a line under the word 'true'; if what it would say is false, draw a line under the word 'false.' If you cannot be sure, guess.

Working time: 1 minute. *Go!*

1. chairs sit are to on . . . . . true — false 1
2. happy is man sick always a . . . true — false 2
3. wood made carpets are of always . . true — false 3
4. water cork on float will not . . . true — false 4
5. thunders rains when it always it . . true — false 5
6. trees roses sea and in grow the . . . true — false 6
7. pays cautious it be to often . . . true — false 7
8. seldom forever good lasts luck . . . true — false 8
9. seldom birds' diamonds nests are in found . true — false 9
10. external deceptive never appearances are . true — false 10
11. always is not a a stenographer book-keeper true — false 11
12. people enemies arrogant many make . . true — false 12

TEST VI

Samples	2	4	6	8	10	12	..14..	..16..
	8	1	7	1	6	1	...5..	...1..

Look at the first sample row of figures above: 2, 4, 6, 8, 10, 12; the two numbers that should come next are, of course, 14, 16. Now look at the second sample: 8, 1 7, 1, 6, 1; the next two numbers would, of course, be 5, 1.

Look at each row of numbers below, and on the two dotted lines write the two numbers that should come next.

Working time: 1½ minutes. *Go!*

10	15	20	25	30	35	.....	.....
6	9	12	15	18	21	.....	.....
8	1	6	1	4	1	.....	.....
1	2	4	8	16	32	.....	.....
8	8	6	6	4	4	.....	.....
3	4	6	9	13	18	.....	.....
29	28	26	23	19	14	.....	.....
16	8	4	2	1	½	.....	.....
1	4	9	16	25	36	.....	.....
3	6	8	16	18	36	.....	.....

TEST VII

Notice the sample:

sky — blue = grass — TABLE GREEN WARM BIG

Sky is blue and grass is green. Green is underlined because it is related to grass just as blue is related to sky.

Look at the problems below. The first two words are related to each other. Notice the third word. One of the words in large type is related to t h i s t h i r d w o r d in the same way as the first two words are related to each other. UNDERLINE THIS WORD IN LARGE TYPE.

Working time: 1½ minutes. *Go!*

1. sit — chair = sleep — BOOK TREE BED SEE . . 1
*2. December — Christmas = November — MONTH THANKSGIVING DECEMBER EARLY 2
3. spoon — soup = fork — KNIFE PLATE CUP MEAT . 3
4. corn — horse = bread — DAILY FLOUR MAN BUTTER 4
5. devil — bad = angel — GABRIEL GOOD FACE HEAVEN 5
6. pan — tin = table — CHAIR WOOD LEGS DISHES . 6
7. wolf — sheep = cat — FUR KITTEN DOG MOUSE . 7
8. hunter — gun = fisherman — FISH NET BOLD WET . 8
9. uncle — nephew = aunt — BROTHER SISTER NIECE COUSIN 9
10. breeze — cyclone = shower — BATH CLOUDBURST WINTER SPRING 10
11. blonde — brunette = light — HEAVY ELECTRICITY DARK GIRL 11
12. polite—impolite = pleasant — AGREEABLE DISAGREEABLE MAN FACE 12
13. succeed — fail = praise — LOSE FRIEND GOD BLAME 13
14. peace — happiness = war — GRIEF FIGHT BATTLE EUROPE 14
15. dark — stillness = light — MOONLIGHT SOUND SUN WINDOW 15
16. music — noise = harmonious — HEAR ACCORD VIOLIN DISCORDANT 16
17. blow — anger = caress — WOMAN KISS CHILD LOVE 17
18. mountain — valley = genius — IDIOT WRITE THINK BRAIN 18
19. fear — anticipation = regret — VAIN MEMORY EXPRESS RESIST 19
20. dismal — dark = cheerful — LAUGH BRIGHT HOUSE GLOOMY 20

The English reader may pass over this.

TEST VIII

Notice the sample sentence:

People hear with the EYES EARS NOSE MOUTH.

The correct word is e a r s, because it makes the truest sentence. In each of the sentences below you have four choices for the last word. Only one of them is correct, In each sentence draw a line under the o n e of these four words which makes the truest sentence. If you cannot be sure, guess.

Working time: 2 minutes. *Go!*

1. Cribbage is played with RACKETS MALLETS DICE CARDS 1
2. The most prominent industry of Chicago is PACKING BREWING AUTOMOBILES FLOUR 2
3. The Plymouth Rock is a kind of HORSE CATTLE GRANITE FOWL 3
*4. Clothing is made by SMITH & WESSON KUPPENHEIMER B. T. BABBITT SWIFT & CO 4
*5. 'The flavour lasts' is an 'ad' for CHEWING GUM DRINK HEALTH-FOOD FRUIT 5
6. Kale is a FISH LIZARD VEGETABLE SNAKE . . 6
7. Rio de Janeiro is a city of SPAIN ARGENTINA PORTUGAL BRAZIL 7
8. John Sargent is famous as a SCULPTOR AUTHOR PAINTER POET 8
9. The clavicle is the SHOULDER HEAD ABDOMEN NECK 9
10. Eucalyptus is a MACHINE TREE DRINK FABRIC . 10
11. The multigraph is a kind of TYPEWRITER PENCIL COPYING MACHINE PHONOGRAPH 11
12. The piccolo is used in MUSIC STENOGRAPHY BOOKBINDING LITHOGRAPHY 12
13. The author of *Treasure Island* is POE STEVENSON KIPLING HAWTHORNE 13
14. The spark plug belongs in the CRANK CASE MANIFOLD CARBURETOR CYLINDER 14
15. Kelvin was most famous in POLITICS WAR SCIENCE LITERATURE 15
16. The number of a Papuan's legs is TWO FOUR SIX EIGHT 16
17. The silo is used in FISHING FARMING HUNTING ATHLETICS 17
*18. Dewey defeated the Spanish fleet in NEWPORT NEWS BOSTON HARBOUR CHINA SEA MANILA BAY . 18

* The English reader may pass over these.

*19. The Packard car is made in DETROIT BUFFALO TOLEDO FLINT 19

20. A regular five-sided figure is SCALENE RHOMBOID EQUILATERAL ELLIPTICAL 20

The corrected scores for the different tests of this intelligence examination will be found [at the end of this book]. The general directions for scoring should be carefully read before scoring examinations. The result of the examination is expressed in a total score which is the sum of the scores for the several tests.

PERSONAL SCORING TABLE

Personal Scores	*Test*	*Maximum Score*
	I	6
	II	10
	III	8
	IV	20
	V	12
	VI	10
	VII	20
	VIII	20
	Total	106

This score which you have secured may be transformed into mental age. Mental age is a measure of intelligence which corresponds to chronological age only in the early years of life. The average intelligence for all adults appears to be just under fourteen years' mental age. The table below gives a classification for all adults from the low-grade feeble-minded to the genius. Indicated in the right-hand column are the percentages for men and women expected to fall into each of the arbitrary groupings named in the left-hand column. If all adults were lined up together according to intelligence this percentage distribution could be expected. Comparing our scores with this table makes it easier for us to understand

* The English reader may pass over this.

our relative ability for mental work. The score-range før the examination just taken is indicated for each of the intelligence groups in the third column and the corresponding mental age range in the second column.

INTELLIGENCE CLASSIFICATION

Intelligence Groups	*Mental Age Range in Years*	*Score Range*	*Per cent of Adults in Groups (Total 100 per cent)*
A Very Superior (incl. Geniuses)	18·0 up	68–106	7
B Superior	16·5–17·9	53–67	10
C plus High Average	15·0–16·4	38–52	17
C Average	13·0–14·9	23–37	25
C minus Low Average	11·0–12·9	13–22	20
D Inferior	9·5–10·9	4–12	14
D minus Very Inferior	7·0–9·4	0–4	6
E Useless (Including low grade feeble-minded)	0·0–6·9	....	1

A sub-classification of the 'Very Superior Intelligence' group, which includes the upper 7 per cent of all adults, follows. This 'A' intelligence group is divided into A prime, A second, etc., with the score-range for the self-examination in the second column. The right-hand column gives the distribution of the 7 per cent of all adults of 'very superior intelligence' for these four sub-groups. If you find your score rates you 'A1' this means you are one of the seven best in an average hundred, and in that at least five of these men are better than you in intelligence.

VERY SUPERIOR INTELLIGENCE' CLASSIFICATION

Group	*Score Range*	*Per cent of all Adults in Group*
A 4	86–106	1·0
A 3	78–85	1·7
A 2	73–77	1·8
A 1	68–72	2·5

The rating secured by this self-examination can be made very suggestive. However, it must not be considered as an *exact measure* of your intelligence, especially not if the timing of the test was done by yourself. It is recommended that as soon as possible a measure of your intelligence be secured by an examination conducted under laboratory conditions. The rating from any standardized intelligence examination can be obtained in mental age terms and the rating thus interpreted can be compared with the norms of achievement given here in mental age.

The general intelligence examination secures a rating upon one's capacity to benefit from training, that is, ability to learn. It does not measure professional or trade ability, nor does it measure the qualifications which have primarily an emotional basis. However, strong emotional qualities frequently enable the individual to compensate for a lower grade of intelligence than is considered possible for his success in the occupation of his choice. This statement also applies in the opposite direction. Persons of superior ability are sometimes unable to adapt themselves successfully to the occupational world because they are unstable emotionally. Because of this they are unable to direct their own behaviour although they have the intelligence for high-grade achievement.*

21. PLANNING FOR HEALTH

> Every palace, every city almost hath his peculiar walks, cloisters, terraces, groves, theatres, pageantry, games, and several recreations; every country, some professed gymnics to exhilarate their minds, and exercise their bodies.
>
> *The Anatomy of Melancholy*, BURTON.

HITTING a ball from one bunker to the next is not the whole story of 'peculiar walks.' There is more to it than that. I

This is the end of the quoted matter from Dr Fryer's book.

saw recently a plan of a stadium that was to seat, if I remember rightly, 40,000 people, and provide standing room for 140,000. Thousands of people every week get damp feet, cold noses, and hoarse throats watching small groups of men kick balls about. In the evening they visit the local cinema to watch the latest gangster film from Hollywood. Thus vicariously do they satisfy their bodies' need for exercise and their savage lust for violence. No wonder the physical state of the nation alarms those in power. Yet what is one to expect when over a fifth of the population of this country is herded in that vast urban area known as London.

Modern civilization proceeds by a series of inco-ordinated moves from one expediency to the next, a method of progression faithfully imitated by us who make up that civilization. The result is that we have not, so to speak, yet sat round a table and asked each other what we want to do about it all. We haven't decided what is the good life—the life, that is, that is most desirable for a human being to live. We have to spend so much time forestalling the next disaster or planning the next act of aggression that we have little spare time for planning our lives. The word 'planning' has, it is true, been overworked, but that it is difficult to avoid using it indicates the absence of planning in so much of our activity.

Are you, for example, planning for health, planning for physical fitness? It is no good hiding behind words like 'community,' 'society,' for you are the community and the society. You cannot develop your talents to the full unless your body is in a state of balance and physical harmony. The Greeks, as you have probably been told before, knew this well. They did not leave physical fitness to chance. Greek athletics were part of religion. The perfection of the human body was an important aim in the development of the whole and complete man, a perfection which was echoed by the most beautiful sculpture the world has seen.

The cult of physical fitness can, of course, be carried too far. It can be carried too far—as to some extent it has been —in the worship of the athlete. Not the athlete but the athletic ideal is to be admired. Worship has this danger—

that it saves the worshipper from imitating the worshipped. One has much sympathy with the point of view put forward by Euripides when he wrote: 'What good does a man do to his city by winning a prize for wrestling or speed or quoit-heaving or jaw-smiting? Will they fight the enemy with quoits? Will they drive the enemy out of their country without spears by kicking? No one plays antics like these when he stands near the steel.' Euripides, I think, rather missed the spirit of things, but was expressing the natural exasperation of the man of brain with the man of brawn, for he goes on to say: 'Garlands of leaves should be for the wise and good, for the just and sober statesman who guides his city best, for the man who with his words averts evil deeds, keeping battle and civil strife away. Those are the real boons. . . .' They are indeed the real boons, but there is no reason why the just, the wise, and the sober man (and I assume somewhat rashly that you are all three) should be ashamed of his body.

WHAT A SIGHT FOR THE GREEK GODS!

The great systems of the body—circulatory, respiratory, nervous, excretory, alimentary—are planned on a generous scale so as not to let the muscles down in times of stress. If you do nothing with your muscles, then these bodily systems will undergo the physical degradation that always attends unemployment. They want work, and unless you exercise the muscles they will have only marginal employment. Obviously, the muscles also need work for their own sake. You know that if you live in a town and buy a large dog you have to spend a definite time each day in exercising it. Don't forget that you yourself are an exceptionally large dog, and by this time probably not feeling so gay as you did. That gross pendulosity that hangs in front of you almost like an apron. That thick coarsely corrugated neck. Those wads of fat on the shoulders. What a sight for the Greek Gods you would be.

You retort with justice that you are a victim of circumstances—of circumstances that you and every one else have created. You have not planned a life in which systematic exercise in the open air and in the gymnasium is as much a part of existence as bacon and eggs for breakfast. You won't make up your mind to take the leisure that the modern machine should give you: leisure to stretch your muscles, 'to stand and stare,' to talk in the market-place. All this, I seriously suggest, is important if your health is to be brushed up to any good purpose. You can do much with Müller's exercises if there is room enough in the flat. You can walk across the park on the way to the office. You can walk to the place where you usually have lunch instead of taking a bus. You can even buy the large dog referred to if you need stimulus. In these ways the daily consumption of calories can be raised and muscles be prevented from going into the decay of complete disuse. Walking is, indeed, a fine exercise, and can be extended profitably in the week-end. Swimming and horse-riding have the virtue that they exercise the large muscles of the body, and can be indulged in by people of all ages.

But you may say that these things are not easily available. Unfortunately one cannot gainsay that. The Peckham Health Centre has set an example that might well be followed in other parts of London and of England. There should be centres in urban areas where the worker (and I mean more especially the office worker) can have access to gymnasium, swimming-pool, boxing, fencing, tennis, squash rackets, and so on. There should be, but there are not. You must therefore do the best you can, and should at least take some sort of exercise in the week-end if you can get none during the week. One game which is now very popular has the advantage that it provides you with concentrated exercise in a relatively short time—squash rackets. But it is not the ideal form of exercise for the sedentary worker past middle-age, especially if he plays with someone younger and a little better than himself.

What is the criterion of excess? In general terms—fatigue. If you are unduly tired after a game; if you do

not feel refreshed and invigorated when the sweat and the heat have passed away, then obviously you are gaining no benefit from the game, and may even be harming yourself. Once you have trained yourself into any form of exercise (and you should do this gradually if you have been abstaining for some time) you should secure a sense of bodily well-being, a muscular righteousness, a glowing skin, after the performance. If these are absent and exhaustion takes place, then you are overdoing it, and had better shade off into that acrimonious but less strenuous game, croquet. Golf, of course, is the happy solution for the middle-aged and muscle-bound. You can always find someone as bad as yourself to play with. The reverent attitude adopted before hitting the ball induces a salutary feeling of humility in the hitter, a feeling often justified by events subsequent to the hitting. The only things to be said against golf are the sand that gets into your eyes from bunkers and the loud optimism of the club-lounger. But suffering in a good cause has its psychological value.

More important for younger people than ball games are systematic recreational exercises, gymnastics, swimming, dancing, athletics. The various ways in which the muscles of the body can be employed in these activities are well illustrated in the two volumes entitled *Recreation and Physical Fitness*, issued by the Board of Education. You should get your son and daughter to join in group exercises from an early age so that they may develop poise and balance of body, a poise and balance that will find a reflection in the mental and moral sphere. It is well to remember that the strain of competitive games and athletics at school may be injurious to the boy or girl who is pressed hard to achievement for his house or for his school. The overstraining of the skilled and the neglect of the mediocre form a most regrettable feature of some public schools. Enjoyable and exciting as are the various ball games, the more co-operative forms of group exercises (e.g. in the gymnasium) are probably more profitable for general physical development.

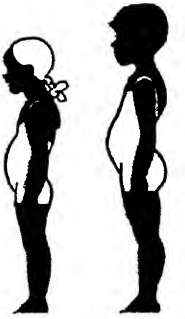
From the beginning careful attention must be paid to correct posture. The evils that come from faulty posture

are manifold. One cannot, of course, expect good posture in a child who is under-nourished or over-tired. Good food and adequate rest are essential. The former has been dealt with earlier on in the book. The importance of the latter particularly needs stressing these days, as there is a tendency to let children stay up late at nights—at times after having been to a cinema. The result is the child gets over-stimulated and over-excited. Consequently it needs more sleep and actually gets less. The resulting fatigue will show itself in 'nerviness,' bad appetite, and bad posture — round shoulders, flat chest, protuberant belly, flat feet. The faulty posture will increase the sense of fatigue and produce disorders of the digestive system. There is too a strain on the actual skeletal structures (especially the spine) that are thus distorted.

To maintain a natural poise of the body the muscles, especially the large muscles of the trunk, must be in train and kept exercised (granted always adequate rest, food, and fresh air). From the start variety of exercise should be the order of the day. By this I mean that the child should be given every opportunity of using his muscles in ways that,

preferably stimulate and satisfy his curiosity. For example, a child of eighteen months will get a lot of fun scrambling up a flight of stairs to discover what is at the other end. Yes, this is physical training. An older child will want to clamber over five-barred gates and climb trees. The town child will probably have to be satisfied with a climbing frame. Exercise must not be too grimly pursued for its own sake. All exercises and games must stop short of exhaustion. If the child is overtired after games they will do him more harm than good.

Four positions of the body are commonly adopted by us all, children and adults. They are sitting, lying, standing, walking. You expect your child to sit at the same table as yourself, and on a chair that is the same height from the floor. Obviously the ideal of having a chair to fit each member of the family is not economically feasible. But in the nursery the child should have his own chair, one that will enable him to sit comfortably upright with his feet planted firmly on the ground: they shouldn't dangle or only just touch the floor. There should be good support for the lower part of the back; this will not be possible if the seat



BAD POSTURE—ROUND SHOULDERS, FLAT CHEST, PROTUBERANT BELLY

is too deep. You should not let the child sit with his feet tucked under the chair and his body bent at the waist. You cannot, however, expect him to sit 'properly' if the table and the chair are designed for someone several years older. What applies to the child applies to yourself. If you have to spend much of your life sitting down you should at least see that the sitting is good. The chair on which I am sitting now is a reasonable height from the ground for my length of leg, but the desk is too low. The result is that I tend to sag over it. I am sure that my abdominal organs object, that my lungs dislike the restricted movement imposed on them, and that my spinal column will in time become set in a drooping curve if I do not soon remedy matters.

The sergeant-major's stance is as bad as the sloppy stance. The chest blown out, the chin retracted almost to the spine, the shoulders rigidly braced back, the belly concave and immobile—what an unphysiological, besides being slightly ludicrous, position. The chin should of course be kept in a bit, and the head held up and straight, the belly and the seat want a little tucking in, the chest wants 'holding up,' but it is a mistake to try to iron out all the natural corporeal curves. Teach the child to walk with his feet pointing forward and as close together as possible. Do *not* make him turn his toes out. In walking the weight is mostly carried on the outer side of the feet.

In company with all civilized people you probably have reconciled yourself to the deformities of your own feet and the future deformities of your children's feet. Corns, bunions, rigid toes, flat feet, painful feet—all these because we wear shoes designed for anything but the human foot. A faulty foot makes itself felt throughout the rest of the skeleton. One limps; the hip is tilted to one side; the spine is bent in the wrong place. Modern feet are martyrs to modern fashions; and it is an expensive martyrdom. Experts hold that the inner border of the shoe or boot should be straight from heel to toe, that the front part should be broad enough for the toes to lie naturally in it, that the shoe should fit snugly over the arch and instep, and loosely over

the toes, and that the heel should not be over 1¼ inches high. If you walk on pavements rubber heels relieve the body of the jar of impact.

It may be that people exist who do not mind how many dips and curves a child's bed has, but it is evident that a spine is not going to preserve its natural shape if it remains folded up eight hours out of the twenty-four. It pays to buy a good mattress for your children as well as for yourself.

This talk about chairs and mattresses must seem to you rather prosaic stuff and a most unromantic approach to brushing up your health. But these things that are commonplaces of your daily life are what really matter. It is remarkable how people will put up with uncomfortable chairs, too high or too low tables, bad lighting, indifferent food, and then grumble because they feel tired, stiff, rheumaticky, bored, blasé, and bewildered.

Before you go to bed to-night have a look at yourself nude, in a full-length looking-glass; get a good profile view if you can. After that don't waste time repenting. Get to work.

22. THE SKIN GAME

> Baths are either artificial or natural, both have their special uses in this malady, and as Alexander supposeth . . . yield as speedy a remedy as any other physic whatsoever.
>
> *The Anatomy of Melancholy*, BURTON.

ONE of the virtues of exercise referred to was that of allowing the lungs to give full expression to their function in life—i.e. taking up oxygen and giving off carbon dioxide, water, and heat. A sedentary worker living most of the time in a warm humid atmosphere (e.g. an office) will not lose much water through the lungs. The outdoor worker, especially

in dry air, will lose a lot of water by evaporation through the lungs. This will cool the lungs and therefore more arterial blood will pass through them to keep up the temperature. Lungs that are not properly ventilated, exercised, and flushed through with blood will be more prone to catarrhal conditions than those that are.

The flat cells that line the air sacs of the lungs, and through which oxygen and CO_2 have to pass between the blood and the air, cover an area of about 500 square metres. Please remember this when you have been sitting indoors for several days. The surface of the skin spreads over (in the average man) an area of only 1½ square metres. But its extent is vastly greater than this if we include the sweat glands, whose ducts open on to the surface of the skin. The secreting surface of these glands has been estimated as approximately 1,080 square metres, and the total length of all the sweat ducts as three miles. In addition to the 2,000,000–3,000,000 sweat glands there are some 650,000 sebaceous glands, usually clustered round hair-roots. The sebaceous glands provide an oily covering for the skin, and keep it pliable.

Another great virtue of exercise is that it flushes through the three miles of sweat-piping, and floods the surface of the body with blood. The skin is indeed a most important organ of the body, and one that we strangely neglect. This durable, pliable, elastic, and extensible covering forms a natural frontier between the outer and the inner world. Once the frontier is passed great damage may be done. If it is broken through over an extensive area (as in burning) death may ensue. The skin keeps out bacteria; regulates the loss of heat from the body to the atmosphere; through the important sensation of touch 'contacts' man with his environment in a thousand different ways; through the sensations of pain, heat, and cold, tells man of much that is disagreeable and to be avoided. Through its vascular reactions it expresses emotion. It plays an important part in sexual life.

Whether thick-skinned or thin-skinned, you must, therefore, utilize fully this valuable part of your anatomy. There

is no need to beat it, mutilate it, tattoo it, or cover it with sackcloth and ashes to remind yourself of its existence and of the fact that you hide it from view with plant-stuff and the skins of other animals. Let it glow and sweat with regular exercise throughout the winter, and expose it to the sun and the air in the spring and the summer. The long rays of the sun warm up the tissues and the blood under the skin. The short ultra-violet rays exert their influence on the surface of the skin. It is these rays that convert the ergosterol of the skin into vitamin D. Besides preventing and curing rickets, ultra-violet light kills bacteria.

The sun-bath does many other things besides manufacture the antirachitic vitamin D. It increases the growth of the hair, heightens the resistance of the skin to infection, flushes the skin, and promotes the secretion of sweat. It increases the number of red corpuscles in the blood, lowers blood-pressure, heightens the tone of muscles, stimulates the combustion of food-stuffs in the body, and gives you an appetite. Two things it does in particular—it reddens and pigments the skin. The reddening—erythema as it is called—comes on between four and twelve hours after exposure, and is the result of the action of the ultra-violet rays. Pigmentation is also the result of the action of these rays, and is thought to protect the body against subsequent undue exposure, the pigment converting the radiant energy into heat, which is sweated off.

Although the experts have a private quarrel about the importance of pigmentation most people seem to feel better when they are brown. Rubbing of vegetable oils into the skin encourages tanning. The effect of being without sunlight in the arctic regions was described by Shackleton thus: 'After four months of night our faces were green and yellow. The sun, however, quickly recoloured us. Less frequently the brown and black eyes of the members of our party became blue or grey during the long night.' But you can, unfortunately, have too much of a good thing, and a lot of damage has been done by prolonged exposure. People with weak chests (perhaps with a history of consumption) should be especially careful, as should people with weak hearts.

They should not, in fact, take sunbaths without the advice of a doctor. You should not sit in the sun—or certainly not the midday sun—after a meal, when all blood should be on tap for the stomach and the intestines. It is best to keep in the shade in the heat of the day—say between twelve and three. But if you share with mad dogs a passion for being roasted at least keep your head and your spine covered.

The sun prefers brunettes and dislikes blondes, especially blondes who freckle. So if you are one of the latter you will have to go slowly. The best time for sun-bathing is the early morning and the late afternoon. Expose yourself for a few minutes only to begin with and increase the duration each day. If you are very pallid and 'a bit run down' you had better start by exposing only your arms and your legs. When you are far enough advanced to expose the whole body turn it every five or six minutes, so that it is well done and not over-done. If you burn your skin or feel tired or heavy or in any way worse after a sunbath don't delude yourself that it is your liver or something you had for breakfast. It is too much sun, and you must cut down the exposure.

But you need not expose yourself directly to the sun in order to get a dose of the health-giving ultra-violet rays. Sir Leonard Hill has pointed out that 'the clear blue sky is estimated to give more ultra-violet than the sun at its zenith.' If you sit in the shade and expose your body to the clear blue sky you will get all the benefit you need provided you are warm. (It is as well to remember that the ordinary glass window-panes shut out ultra-violet rays.) The action of cool dry air on the skin is also of the greatest benefit. It stimulates the nerve-endings in the skin. It increases metabolism. It stirs up the flow of blood and lymph. It wakens the sluggish flesh into activity. So too does the action of the sea. The tonic effect of sun-rays, air, and sea-water on the exposed skin is something that too few people enjoy and for too short a time. Our unnatural modesty and morbid dislike of the nude body make exposure an actionable offence unless carried out with a multitude of

precautions. If a woman walked through Hyde Park completely nude on a warm summer's day there would be a riot: if we all did it nobody would take any notice. Custom doth make cowards of us all.

IF A WOMAN WALKED THROUGH HYDE PARK COMPLETELY NUDE THERE WOULD BE A RIOT

23. HOT AIR

> Great need is therefore to be taken at what times we walk, how we place our windows, lights, and houses, how we let in or exclude this ambient air.
>
> *The Anatomy of Melancholy*, BURTON.

IF you can, then, give your skin a chance more often than the short time afforded by the summer holiday. If you are

young or vigorous enough a cold shower or bath in the morning will do a lot of good. And you can at least see that the heating and ventilation in your own house or office are such as will promote health and comfort rather than defy them. Those funny sayings of the week in the House of Commons, for example, are not necessarily expressions of feeble-mindedness on the part of our representatives. Owing to faulty ventilation of the House of Commons Members of Parliament sit down to deliberation with cold feet and hot heads. One result of this disastrous combination is that the mucous membrane of the nose swells and blocks the air-passages. The member for Xchester feels hot, stuffy, and uncomfortable, and lays himself open to catarrhal infection. Mental and physical equilibrium could be restored if he plunged his feet into hot water, and the necessity for this would be obviated if the floor of the House of Commons were warmed, as has been done in some recently built schools, where hot pipes are laid in channels under the floor.

You may not, of course, be able to order things for yourself just as you wish, and systems of heating that can be installed in modern public buildings may be too expensive or too elaborate for your own house. But an understanding of some of the principles involved may be helpful. The thing to be avoided is large differences of temperature at different levels between the floor and the ceiling. Hot air in the wrong place is discomforting and unhealthy. In the absence of efficient ventilation steam or hot-water pipes and closed stoves make the upper layers of air in a room warm and humid. Overhead steam pipes and the discharge into a room of hot air overhead produce steep and uncomfortable gradients of temperature. With heating by hot air the walls tend to be cooler than the air, and this also gives rise to discomfort. With radiant heating the walls are generally warmer than the air.

Open fires and gas fires *with flues* give out radiant heat and warm the floor for a fair distance round; so with these you need not fear you will get cold feet. Most people have an affection for coal fires. They are bright and cheerful, and by the draught up the chimney keep a current of air moving

in the room. But as a method of providing heat the coal fire is inefficient. It is dirty and increases dust in the room. It fouls the air, and its smoke has helped to make London fogs notorious throughout the world.

Hot-water radiators are unpopular with some people, but it is a comfort to know that heating from a hot-water radiator standing on the floor produces only slight gradients of temperature. If you want to be luxurious you can install hot panels in the walls or in the ceilings. With the panels spread over a wide area only a low temperature need be maintained, and evenly diffused warmth will surround the occupants of the room. On the other hand, much can be done with small high-temperature panels heated by gas or by electricity fixed high up on the walls at the sides and corners of a room and inclined so as to radiate down and across it.

Although you may not be able to play about with systems of heating you can at least control to some extent the temperature of the rooms in which you live and perhaps of those in which you work. This is important, because it is quite clear that efficiency of work varies with different temperatures, at all events physical work. Observations in coal-mines and factories have shown that more work is done at cool than at warm temperatures. Dr Vernon found during the Great War that when the temperature of a large munition works was between 65° and 69° F. the accident rate was at its lowest. When the temperature fell below 65° F. or rose above 69° F. the accident rate went up. It has also been observed that men who do heavy work at high temperatures suffer more sickness than those working under more favourable conditions. You should then pay some attention to this question of temperature. The comfortable range of heating lies between air-temperatures of 60° and 68° F. You can choose your own most comfortable temperature within this zone and avoid fluctuations by applying thermostatic control to the gas or the electric fire; it is not expensive. See that a room is heated sometime before you use it. What happens in many offices is that the fire is lit when the owner starts work: the air is cold to begin with;

so the fire is stoked high and the windows are shut; finally the room becomes unbearably hot. That is not the best way of doing things.

If the windows are shut in a room full of people the discomfort of the occupants may become acute. It used to be thought that this discomfort was caused by an excess of carbon dioxide in the air. But this is not so. The average sedentary individual turns out about 400 British Thermal Units[1] of heat an hour. Obviously if there are several people doing this the temperature of the room will go up. With no ventilation warm humid air stagnates, and it is this stagnation which is so stifling. The warmer and wetter the air the less does it become possible for the body to give off the heat it is producing. You boil over. That is what happened at the Black Hole of Calcutta: the victims died of heat-stroke. It is therefore of the greatest importance to see that air is kept on the move. It is the great virtue of the coal fire that it does this. Many of the flats and small modern houses that are being built these days have flueless rooms. This presents a problem in ventilation. It is not even clear that the addition of an air-brick improves the ventilation of a flueless room. So do not forget the value of that convenient opening to the outer world—the window.

24. THE TALE OF THE DEAD RATS

Deaths, tempests, plagues, our astrologers foretell us. . . .
The Anatomy of Melancholy, BURTON.

'ON the 28th August the s.s. *Delambre* reached Liverpool with a clean bill of health from Rosario, Buenos Aires, Santos, and Las Palmas. The vessel carried a cargo of maize and other grain, cotton in bales, and bananas, and during the process of unloading on the 3rd and 4th September eight dead rats

[1] A British Thermal Unit is the amount of heat required to raise the temperature of 1 lb. of water 1° F.

were discovered. As their examination indicated that two were probably infected with plague, full precautions were taken immediately, including the fumigation of the vessel with hydrogen cyanide and the institution of an extensive rat campaign. *Of the rats recovered from the vessel four were found to have been infected with plague, and the incident illustrates the danger to which our ports may at any time be exposed.'* (The italics are mine.)

DEAD RATS WERE DISCOVERED

This plain tale of a voyage from distant parts might have come from the Fugger's Newsletters. It is in fact from the Annual Report of the Chief Medical Officer of the Ministry of Health for the year 1936. You can sleep peacefully at night and walk fearlessly in the daytime because of the great vigilance exercised for you by our magnificent public health services. For you sickness is something that becomes significant only when it attacks you or your family. The drama then is intense and personal, and your family doctor is at these times an ally of great power, almost a god when the crisis comes between life and death. But beyond there is the cosmic drama acted by the health officers of this and of other countries. The s.s. *Sea Rambler* reaches the River Tyne in September 1936 with seven dead out of a crew of twenty-five. The s.s. *Sea Rambler* has been to places with colourful names—Daker Bay, Zighinchor, the River Kasimanze. At Zighinchor it was hot and the mosquitoes were 'very bad.' Opposite Carabane they were 'terrible.' The crew begins to sicken and at one time food poisoning was thought of. But no one has yet suspected the truth. The Port Medical Officer of Health of the River Tyne takes blood from the crew, and sends samples to the Ministry of Health.

In the cool of the laboratory the blood is injected into mice. The Medical Officer was right. The seamen had died from Yellow Fever. The vessel was fumigated so as to destroy all mosquitoes that might have come over and 'at the River Tyne all necessary steps were taken.' Thus laconically is the tale ended. Yellow fever has reached these shores for the second time in seventy-one years.

I am not of course suggesting that in order to brush up your health you should learn how to fumigate your house so as to rid it of mosquitoes. But you should know a little about the work that is quietly being carried on day in and day out by the Public Health Service so that you may have some health left to brush up. The only time you show any interest is when something goes wrong, and great indignation is displayed over a small outbreak of typhoid fever in Croydon, involving some three hundred people, about forty of whom died. I believe that an average of three people are killed daily on the roads, but that doesn't matter so much as most of us own cars these days. Any attempt to interfere with the liberty of the subject to drive as fast and as furiously as he wishes is resented. It is as though we don't mind death or particularly value human life, but do object to certain ways of dying. We make a loud protest when a few germs escape into the water supply, but do not really care how the water is supplied or take much interest in how we are protected from the fevers that afflicted our ancestors.

The London water mains are 6,970 miles in length, or 2,970 miles longer than the Amazon. The London water supply includes 49 storage reservoirs, 92 service reservoirs, and 178 filter beds. In a recent year nearly 13,000 bacteriological tests were carried out on London water.

Let us look at what happens in one of the waterworks near London. Water from the Thames passes into a storage reservoir which holds as much as 718,000,000 gallons. Then it goes through rapid sand filters, and afterwards undergoes slow sand filtration. Then on to a depot where ammonium sulphate is added; and, finally, the water is chlorinated and transmitted to the service reservoirs, ready for transmission to one of the largest cities of the world. All this is being

done to protect you from water-borne infections. In 1849 there were 14,000 deaths from cholera in England. In the severe epidemic of cholera in London in 1854 Dr John Snow told the vestrymen of St James to remove the handle from the Broad Street pump if they wanted to stop it. The handle was removed. The people therefore could not drink the water. And the epidemic ceased. Cholera is now unknown in this country. Another water-borne infection has come largely under control—typhoid or enteric fever. The average annual number of deaths from enteric in the period 1871–80 was 7,842; the figure for the period 1921–30 was 428. In 1935 only 174 people died from enteric. Occasionally, as at Croydon in 1937, typhoid bacilli found their way into the water and a number of people became infected. The Medical Officer of Health mobilizes his forces, calls in experts from the Ministry of Health, and the outbreak is under immediate control.

25. DEATH IN THE BOTTLE

> Milk, and all that comes of milk, as butter and cheese, curds, etc., increase melancholy. . . .
>
> *The Anatomy of Melancholy*, BURTON.

BUT water-borne infections are rare—so rare, indeed, that when they occur they become front-page news and receive as much public attention as the particular war that happens to be in the fashion at the time. Infections conveyed by milk do not have the same fascination for the public mind. Newspaper editors have a most unwholesome respect for milk. Yet it has done the most deadly things. In Montreal, in 1927, 5,000 people caught typhoid fever from drinking infected milk and 500 died. In Bournemouth in 1936 718 unsuspecting persons also fell ill of typhoid after drinking milk, and 51 of them died. Yet there was peculiarly little publicity about this in the press. The epidemic was controlled *as soon as the milk was pasteurized.* There was little

fuss made about this. In the same year over 100 children in the borough of Wilton fell ill with 'headache, fever, vomiting, diarrhoea, and collapse,' as a result of drinking raw milk. And in the same year over 160 people contracted scarlet fever from drinking unpasteurized milk. This is how it happened. One of the milkers on the farm the milk came from had a child. The child had scarlet fever and later a discharging ear. (Scarlet fever is caused by a germ called the haemolytic streptococcus.) The milker had a sore throat. An inquisitive bacteriologist found a haemolytic streptococcus in the throat of the milker that was of the same type as that obtained from his child's ear-discharge. The milker was suspended from work. But cases of scarlet fever and sore throat continued among the farm's customers. The same type of streptococcus was then found in the milk. Finally the same streptococcus was found to be infecting the udder of a cow which had been regularly milked by the man who had a sore throat whose child had a discharging ear from scarlet fever. The pasteurization of the milk ends the story.

Raw milk may hand to you or your children scarlet fever, diphtheria, typhoid fever, gastro-enteritis, sore throat, 'toxic' poisoning, undulant fever, dysentery, and tuberculosis. Between 1912 and 1935 some 150,000 persons contracted bovine tuberculosis by drinking milk, and over 60,000 of these died. Some 2,000 people—mostly children—still die yearly from bovine tuberculosis as a result of drinking unpasteurized milk. What a hullabaloo there would be, what a public scandal of the first magnitude, if this tragedy were traced to our water-supply. What a hounding there would be of Medical Officers of Health, and of Ministers and Local Government officers. No Government could survive such an outrage on the public conscience and the public health. When Asiatic cholera spread across Europe in the last century and reached Paris in 1832, Heine observed that the dread of disturbing private business was one of the chief obstacles encountered by public health movements. The opposition to pasteurization has been costly in human lives, but private business has been respected,

and that, after all, is what really matters in our modern business world.

But if you wish to brush up your health by drinking more milk, to persuade your children to do likewise, then at least make sure that it is safe. If you live in the country and get your milk from a farm that can't afford to pasteurize it, then boil it yourself before drinking. Remember that about 50 per cent of the cows in this country have tuberculosis. You can encourage the elimination of this bovine tuberculosis by buying T.T. milk (milk from tuberculin-tested cows); this should be pasteurized too, for tuberculosis, as you see, is not the only disease conveyed by that happy breeding ground for germs—milk. The safest milk for you and your children is T.T. milk, pasteurized.

26. WHY NOT PREVENT IT?

> We can most part foresee these epidemical diseases, and likely avoid them. . . .
>
> *The Anatomy of Melancholy*, BURTON.

TUBERCULIN testing, as you know, is carried out to see if the cow has tuberculosis. Tuberculin (a vaccine made from the tubercle bacillus) has been used in the treatment of tuberculosis and in various forms as a preventive inoculation against this now happily declining disease.

While no clear case has yet been made for inoculation against tuberculosis, inoculation against other diseases usefully supplements the measures instituted by public health authorities against infectious disease. These may not concern yourself so much as your children. Ever since Jenner broadcast the fact that dairy-maids who caught the mild disease cowpox did not contract smallpox vaccination has been practised in all corners of the world. While it is true that the present rarity of smallpox (only twelve cases were notified in 1936) is not solely the result of vaccination, there are two undisputed advantages in being vaccinated.

One is that you are far less likely to get smallpox if an epidemic does break out than if you are not vaccinated. The other is that you will be far less likely to die if you do catch it: in one large city in one year 50 per cent of the unvaccinated who caught smallpox died, while of the vaccinated who caught smallpox only 5 per cent died. A somewhat drastic experiment was carried out as long ago as 1802 to prove the value of cowpox as a protection against smallpox. Nineteen boys were inoculated with cowpox, and three months later *twelve of them were inoculated with smallpox.* Nothing happened. Two other boys, unvaccinated, were inoculated with the same smallpox virus and both contracted the disease. The nineteen boys were then re-inoculated with smallpox virus from the two boys who took ill, but they still proved to be immune to the disease. It must have been a bold parent who let the unvaccinated boys run the risk of catching smallpox. Although it is now an uncommon disease and, as a result, people are getting careless about vaccination, there is no telling when the disease may change type and become deadly again. The vaccinated will have the laugh of the unvaccinated.

What will interest you more, perhaps, is the possibility of preventing your child from having such things as diphtheria and scarlet fever. If you can do this easily and safely it will insure the child against much discomfort and misery—and even against the risk of death—loss of time at school, and loss of money for you. First something should be said about immunization in general. When bacteria, viruses, or toxins force an entrance into the tissues of the body they provoke it to manufacture antibodies, chemical substances that will tend to nullify the harmful effect of the antigens, to give the generic name for bacteria, viruses, etc., which stimulate the formation of antibodies. They do this by combining with them. Antitoxin neutralizes toxin. Antibodies unite with bacteria, immobilize them, and weaken their resistance to other attacking forces.

If you have a good store of antibodies to a particular germ you will be unlikely to succumb to an attack from it. If you know of a particularly nasty germ, and would like

to be forearmed against it, your doctor may be able to do this for you. It depends upon the germ. He can inoculate you with a vaccine made up of a large number of representatives of the particular germ which have been rendered harmless in various ways—e.g. killed by heat or by antiseptics. But these dead antigens will still be able to stimulate in you the production of antibodies, which will be ready to disarm the live antigen if it comes along. In other words, you become immune, and are in a condition of what is called active immunity: your body, so to say, has had to work for it. If you have two or three injections of a vaccine made up of dead typhoid bacilli you become immune to typhoid —but not to other infections; the immunity is specific. It is not improbable that anti-typhoid inoculation made it possible for the last war to last as long as it did.

The immunity following inoculation lasts for varying periods for different diseases. If, for example, you wanted to keep up your immunity to typhoid fever (unnecessary in this country) you would have to be vaccinated every year. The natural shortness of the period of immunity after a common cold and after influenza does not encourage one to hope much from a specific vaccine for these plagues. Nevertheless experiments in this country and in the United States of America show that immunization against influenza is a feasible proposition.

If a doctor wants to produce a state of immunity at short notice he can inject into his patients ready-made antibodies: the patient won't have to wait to make his own. This state of passive immunity lasts only a very short time, but is nevertheless of great value. If, for example, any one is inflicted with a severe and dirty wound he runs the risk of getting tetanus. Immediate injection of tetanus antitoxin greatly reduces the risk. In the same way passive immunity against measles, scarlet fever, and diphtheria can be produced by injection of 'anti-serum.' It is obvious that these antibodies should be of great use when a person is actually suffering from an infection. And so they are, especially in the treatment of diphtheria.

Diphtheria is due to infection with the diphtheria bacillus,

which usually attacks the throat. Having secured a lodgment in the throat the bacillus multiplies there and pours out toxin, which passes into the blood stream. It is the toxin which does the damage—weakens the heart, poisons the nerves. The patient is given an injection of serum containing antitoxin. This has been obtained from a horse which has been stimulated to produce antitoxin by injections of toxin. But it is important for the treatment to be given in the early stages of the disease if success is to follow. Therefore always take care to have your child's throat looked at if it gets sore. A sore throat and slight fever is a favourite starting-point of many infections in children.

You can prevent your child catching diphtheria. Not only that, but a test (called the Schick test) can be carried out which will show whether the child is susceptible or not. If susceptible he ought to be immunized against diphtheria. This is done by injecting one to three doses of toxin which has been rendered harmless in various ways. In 1936 there were 57,795 cases of diphtheria in the country, and 3,081 deaths from the disease. You will admit, I hope, that an important part of brushing up your child's health will be to safeguard him against this risk. In the United States of America and Canada they have tackled prevention of diphtheria and on a big scale. This was what they did in New York. Between 1910 and 1920 there were in this city an average of about 14,700 cases of diphtheria, and 1,300 deaths yearly. Between 1920 and 1929 a campaign of immunizing school children was conducted and the yearly average of cases of diphtheria fell to 10,700 and deaths to 700. Between 1929 and 1935 the campaign was intensified and directed to including the children under five years of age: over 1,110,000 children were immunized. In 1936 only 1,143 cases and 35 deaths from diphtheria were recorded. This is a pretty illustration of the hackneyed saying that prevention is better than cure.

Can one do as much against other diseases that are prevalent in this country? Active immunization against scarlet fever is a rather more laborious procedure, but can be done. It is possible to test for susceptibility to scarlet fever and to

have a child immunized if susceptible. Scarlet fever is fortunately a relatively mild disease these days; there were only 495 deaths from it in this country in 1936. Compare this with the 3,000 deaths from diphtheria. Preventive inoculation against whooping-cough has also been tried with more or less success: it is hoped this may be perfected, for whooping-cough is a miserable complaint.

Measles can be temporarily prevented by injection of blood serum which has been obtained from someone who is convalescent from the disease (and so has developed antibodies). An ingenious way of giving permanent immunity is this. If it is known, say, that a child has been definitely exposed to measles on a certain day, the child is given the protective serum not at once, but six or seven days later. The measles germ is, in fact, allowed to incubate. Before the germ has a chance to do much harm the serum is injected. The child now has a very mild attack which does not incapacitate him in the least and confers lifelong immunity to the disease. There are, of course, other diseases against which immunity can be secured, but they do not concern inhabitants of Great Britain.

27. WHEN EAST MEETS WEST

> The air with his meteors, thunder and lightning, intemperate heat and cold, mighty winds, tempests, unseasonable weather; from which proceed dearth, famine, plague, and all sorts of epidemical diseases, consuming infinite myriads of men.
>
> *The Anatomy of Melancholy*, BURTON.

ALL this is but part of the preventive medicine you hear so much about. World-wide organizations work day in and day out to keep you free from disease and the peril of great plagues. An international maritime and quarantine ward at Alexandria keeps watch over the Suez Canal. The International Public Health Office at Paris, in the work of which more than fifty-five governments co-operate, concerns itself especially with international conventions for preventing the spread of disease. The International Health Organization at Geneva has perhaps saved the League of Nations from the taunt of being barren. Non-League members co-operate with it in its great work of preventing disease and promoting health. At Singapore the Health Organization has an Eastern Bureau, which receives early information of the spread of cholera, dysentery, smallpox, typhus, and plague in the parts of the Far East. Singapore collects and sifts this information, and from ten wireless stations broadcasts every day and every week so that health officers in that vast region may have accurate information of what is happening and so know what measures to take.

The Health Organization at Geneva also sets up international standards for such important products as diphtheria antitoxin, insulin, digitalis (a drug for treating heart disease), vitamins, etc. All this is directed to brushing up your health. You are a citizen of a world health state. If, then, you are to get a shine on your health you should recall from time to time that you are such a citizen and

support this non-political world state which is of such value to you.

At the risk of being too solemn I will repeat what a distinguished worker in public health, Dr Milton J. Rosenau, once said:

'Preventive medicine dreams of a time when there shall be enough for all, and every man shall bear his share of labour in accordance with his ability, and every man shall possess sufficient for the needs of his body and the demands of health. These things he shall have as a matter of justice, and not of charity. Preventive medicine dreams of a time when there shall be no unnecessary suffering and no premature deaths; when the welfare of the people shall be our highest concern. . . .

Whether this shall come to pass depends upon you.

28. SOME MODERN PERILS

No man amongst us so sound, of so good a constitution, that hath not some impediment of body or mind.
The Anatomy of Melancholy, BURTON.

PREVENTIVE medicine means more than keeping infectious diseases in check. By seeing, for example, that the child has the right kind of foodstuff rickets and scurvy can be prevented. Not only are the immediate dangers of rickets averted, but a child saved from rickets may mean a future mother saved from dangerous childbirth as a result of a deformed pelvis. The prevention of industrial diseases—lead poisoning, dust diseases of the lung, poisoning from various chemicals—is in our modern civilization obviously of the highest importance. The ravages of the common cold could be cut short if the cold-streaming sufferer were to isolate himself immediately from his neighbours and fellow-workers. Much suffering could undoubtedly be put into cold storage if people did not mutilate their feet with boots and shoes built on 'compressionistic' lines.

In fact prevention can be applied to such commonplace and undignified malformations as bunions, as well as to the graver deformities of rickets, to the common cold, as well as to cancer.

Before saying anything about the preventability of cancer I had better say something about what cancer is, what it does. There is much talk about cancer being on the increase, but this is far from being certain. What is certain is that modern methods of diagnosis have reached such a pitch of perfection that *cancer is the more easily diagnosed*: so more cases of cancer are diagnosed than formerly. People these days are living longer lives; old people are becoming more common; cancer is a disease of old age; therefore more people are living at an age when cancer is common. But this is a different thing from saying that cancer is on the increase.

Cancer is neither contagious nor infectious. You cannot catch cancer from another person or by living in a house where a person with cancer has died. Cancer is not necessarily painful, and when pain does occur it is a late rather than an early symptom. There is probably a hereditary element in cancer, but this does not mean that because either of your parents or grandparents have had cancer you will also have it. All it means is that among the numerous factors that enter into the causation of cancer heredity is only one. Cancer is not a new disease; mention of it can be found in the Rig-Veda and the Ebers papyrus. It was known in ancient Greece and Rome.

A prodigious amount of research has been carried out since the Imperial Cancer Research Laboratories were opened in this country in 1902. A vast array of facts about cancer has accumulated. It is known, for example, that the repeated application of tar to the skin of an animal will cause a cancer to develop. The actual chemical substance in tar which does this has been isolated and can be prepared synthetically. The remarkable discovery was then made that this substance has a chemical structure similar to that of normal substances in the body. Yet it cannot be said that this substance is the cause of cancer; although it is

evident that a fruitful field for investigation has been opened up. There is a type of cancer in fowls which appears to be caused by a virus. Apparently in rats a particular variety of worm causes cancer of the stomach. In fact a number of agents—tar, soot, oils, X-rays, radium, parasites, and viruses—may start off the cancer process. A lot, in fact, is known about the disease, and the more we know the sooner shall we be able to control it.

Cancer is an irregular and a chaotic growth of bodily cells showing itself outwardly as a lump or a hard kind of ulcer. It may appear in such accessible parts as the tongue, the skin, the breast, the womb. It may appear in such internal organs as the stomach. Chronic irritation is an important factor in its causation.

One of the worst features of cancer is the fear that it instils into people. Yet diseases of the heart and the circulation are more than twice as lethal. This fear of cancer often holds a man from going to see a doctor when he feels vaguely that something is wrong with him. Any one who has this fear should visit a doctor immediately in order to have the fear dispelled. Fear itself is harmful. There is one thing especially to be feared in connection with cancer, and that is that the patient may not go to the doctor early enough. This indeed applies to all diseases. Cancer can be cured with the aid of surgery, X-rays, and radium, provided it is caught at an early stage. Remarkable results have been achieved even at later stages. Much depends of course on the site of the cancer. You may say that the fear of cancer is due to the fact that it kills people. It does kill people. So do tuberculosis, heart disease, pneumonia, measles, influenza, bronchitis. Bronchitis killed 17,600 people (at all ages) in this country in 1936: but who is frightened at the thought of bronchitis?

So do not be afraid. If you have passed middle-age and notice, for example, that you have a lump in the breast go to your doctor at once. In all probability it is an innocent swelling. If it is cancerous then you know at least that by not delaying you have given yourself and your doctor the best chance in the world of a successful end to the treatment.

If you pass blood from any part of the body; if you suddenly lose appetite or begin to get thin; if you depart from your usual normal health—then pay a visit to your family doctor at once. Don't put it off. Procrastination may be the thief of life. Whatever is wrong with you the sooner it is put right the better.

One thing is clear in the causation of cancer, and that is the part played by irritation. Years of smoking a clay pipe, for example, may induce a cancer of the lip. Any long-continued irritation should then be avoided and corrected. Badly fitting dentures or jagged teeth may produce ulcers on the tongue: such irritation over a long period of time may end in cancer of the tongue. The dentures should be changed and the teeth seen to. Avoidance or correction of chronic irritation and the effects of such irritation are important preventive measures.

Cancer occurs in certain occupations, e.g. among mule-spinners in the cotton industry; and here, obviously, is a field in which prevention can be attempted, and has been. It was found that lubricating oils used in the industry had cancer-producing properties, that is, that they finally produced cancer of the skin among the mule-spinners constantly in contact with the oil. The Manchester Committee on Cancer investigated the matter, and found that lubricating oils could be made commercially which were practically free from cancer-producing properties. In addition to this it was found that further protection could be afforded by rubbing an ointment into the skin. A fine piece of research in preventive medicine.

From statistical analysis of death-rates it appears that cancer of certain parts of the body is commoner among the poorer classes than among the well-to-do. And it has been suggested that 'a large proportion, at least, of cancer mortality is of a highly preventable nature, for we must suppose that if the conditions of life of all sections of society could be assimilated to those of its upper ranks mortality from cancer of the exposed sites would fall for all classes to the Class I level.' Therefore, to diminish the risk of getting cancer of certain exposed sites take care to get into or remain

in the upper and middle class (i.e. Class I), and not to fall into the class of 'unskilled workers.'

Whatever folly you may be capable of committing, do not commit that of putting yourself into the hands of a quack healer. Some people have a taste for unorthodoxy, and cannot believe that the qualified medical man, the man who has learnt his job, knows more about health and disease than the unqualified charlatan, who pretends to be a martyr to professional jealousy (the pretence usually wears thin because martyrs don't usually make money out of their martyrdom). During the past ten years or so more than five hundred claims to cure cancer have been investigated and found to be worthless . . . a measure of human credulity.

Rheumatism. It is a curious source of comfort to the sufferer to know that old so-and-so has the same trouble as he himself has. So it may comfort you to know that extinct reptiles and Egyptian mummies (or, rather, the people that were mummified) shared with neolithic man the distinction of being rheumatic.

Rheumatism is a vague term, and includes what doctors call rheumatic fever, rheumatoid arthritis, fibrositis, osteo-arthritis. The grave feature of rheumatic fever is that it attacks the heart, especially in young children. It is the commonest cause of organic heart disease, and diseases of the heart and the blood-vessels hold pride of place as the first of the five principal certified causes of death at all ages. Lord Horder has called rheumatic fever 'the killer in a mask.' In its most obvious form it declares itself by painful swelling of several joints, one joint being involved after another. As often as not it is more insidious in its attack, particularly in children. As it is of the greatest importance to put the rheumatic child under medical care at the earliest possible moment, it is as well to mention a few of the warning signs.

The trouble is that the child with subacute rheumatic fever is not frankly and obviously ill, although the heart is being attacked by whatever causes rheumatic fever. Vague complaints of pains in the limbs may be brushed aside by

the parent as 'growing pains.' Doctors don't believe that growing can cause pain. 'Growing pains,' in fact, are a warning signal not to be ignored. Frequent sore throats and acid sweats are other manifestations of rheumatic fever. The child at school may go off his work, become inattentive, fractious, restless, and fidgety. To begin with he will probably be scolded and punished. But a sudden change in a child's behaviour at school needs more careful investigation than this. He may be suffering from rheumatic fever. Just as a child who begins dropping things may be suffering from chorea (or St Vitus's Dance), a condition closely allied to rheumatism and associated with heart disease.

What the actual cause of rheumatic fever is is not known. But various factors help it on, such as damp, fatigue, and exposure. Evidently it is wise to avoid these. In an investigation into rheumatic fever in Bath and Bristol in 1931 one fact stood out plainly—namely, the close association between the incidence of rheumatic fever and the number of persons living in a room. Overcrowding, in fact, is one of the important 'causes' of rheumatic fever, more important, it appears, than dampness. Overcrowding is an index of poverty, and so lack of good food, fresh air, exercise, clothing, must be kept in mind. Some workers, for example, think that lack of vitamin C plays a part in causing rheumatic fever. However, it looks as if the abolition of overcrowding would help to restrict the activities of the 'killer in a mask.'

But what are you, a grossly overfed comfortable middle-aged adult, going to do to put a stop to the twinges of pain in those creaking joints? Smile pathetically as you order another drink to the murmur of '*Anno domini*, old man'? Rheumatic diseases among the insured population costs this country £17,000,000 a year. Rheumatism is an expensive disease. So you had better do something about it and pay a visit to your doctor now. If you put this off until you are really badly laid up then you will also find it an expensive disease.

The stiffnesses of muscles and of joints which in their various forms come under the heading of rheumatism, and which afflict adults, have a different origin from the rheu-

matic fever of children. (Rheumatic fever does also attack adults.) Again many factors of causation come into the picture. Over-eating and over-drinking constitute one factor. Prolonged physical strain and prolonged mental strain, separately or together, may make a joint signal distress. Fatigue, worry, an unrelieved sedentary life, will all help to turn your joints into barometers. Your line of prevention then is this. An early visit to the doctor and the dentist (an infected tooth may be the source of the trouble), moderation in food and drink, regular exercise in the fresh air, adequate rest, a contented mind. Obvious advice which hardly any one will follow.

Tuberculosis. In the period 1861–70 in England and Wales 52,943 persons died on an average each year from pulmonary tuberculosis out of a population of just over 21,000,000. In 1930, out of a population of nearly 41,000,000, 23,801 persons died. There were 80,788 new cases of pulmonary tuberculosis in 1913, and 44,815 in 1936. Tuberculosis is, in fact, on the downgrade. This is, in part, due to the fine campaign waged against tuberculosis by the medical services; but it is as much a reflection of improved social conditions and better diet. Tuberculosis used to be called *morbus pauperum.* Many years ago Gollmer and Karup in Germany investigated the mortality of persons insured by the well-known Gotha Assurance Society between 1829–78, classifying the lives into those insured for sums over 6,000 marks, for 3,000–6,000 marks, and for less than 3,000 marks. The mortality from pulmonary tuberculosis among persons insured for 6,000 marks or more was only 66 per cent of that expected; in the 3,000–6,000 group it was 95 per cent; in the group insured for less than 3,000 it was 132 per cent. In the Registrar-General's Decennial Supplement for 1921 it was shown that the poorer you are the more likely you are to die from pulmonary tuberculosis. So be careful how you choose your economic class. It must, however, be pointed out that the better off you are the more likely you are to get diabetes.

Tuberculosis, apart from the fact that there is now less of it, is a milder disease, and methods of treating it have

much improved. So here again, at the risk, I fear, of being monotonous, I repeat the advice, 'Go to your family doctor if you suspect there is anything wrong with yourself.' Spitting of blood is a common indication of consumption—yet some people ignore it for a long time. A cough that persists, frequent colds, undue fatigableness, loss of weight, loss of appetite, anaemia, a pain in the chest—all these may mean that there is something wrong with the lung. And if this something is detected at an early stage treatment will give the sufferer a chance of living as long as any one else, and of living a useful life too.

29. BACK TO METHUSELAH

> Last of all, it is required that the patient be not too bold to practise upon himself without an approved physician's consent, or to try conclusions, if he read a receipt in a book; for so, many grossly mistake, and do themselves more harm than good.
>
> *The Anatomy of Melancholy*, BURTON.

THERE are, of course, many other modern perils. There are the peril of noise, the peril of speed, the peril of excess, the peril of want. There is, too, the peril of the patent medicine whose virtues reside solely in the pernicious art of the copy-writer of modern advertisements. But the public—and you are the public—likes to be gulled and lulled into a sense of false security. It likes to be able to believe—if only for a brief moment—in something so wildly impossible that belief must perforce temporarily displace reason.

You may perhaps have observed that there is one feature common to the three diseases briefly discussed in the last few pages, namely, the part played by social and economic conditions, especially in tuberculosis. It is clear that the standards of life and method of living of what we call the upper and middle classes make for better protection against tuberculosis, rheumatic fever, respiratory disease, and against

some forms of cancer. Descend low in the economic scale and the chance of dying from certain diseases is increased and the chance of good health decreased. I am not trying to draw any social or political moral from this, but am trying to see how this fact can be applied to your health. What sort of things does an 'upper-middle' position give you? Plenty of roof over your head, good food, adequate clothing, opportunity for fresh air and exercise, leisure for relaxation—in fact, a good environment which on the whole makes it possible for you to make the best of yourself. It certainly does not give you better medical attention, or better drains, or a better water supply, or even better weather. In brushing up your health, then, it is evidently important to obtain these things and to use them properly: to balance the intake of good food with the output of moderate exercise, to relax after strain, to seek quiet after noise, to take your leisure after work, to breathe pure air, to nourish the mind as well as the body—to be, perhaps you will retort, wise before your time.

PERIODICAL HOBNOBBING WITH THE DOCTOR

Yet disease may call upon you however well-intentioned your life may be. With more people living beyond middle-age the complaints of this and of later years become of increasing importance. Many of them creep into the system with a gradualness that for a time deceives the sufferer. You may, in fact, be ill some time before you actually feel ill. Sooner or later a painful day of reckoning comes, and more or less forcible readjustments have to be made. Cannot something be done about this?

The obvious precaution is to be thoroughly overhauled at regular intervals. This is so obvious that few people think of doing it. You go (at least it is presumed you go) regularly to the dentist to see if any of your teeth have begun to rot. Why not go to your family doctor with equal regularity to see if any other part of your body has begun to rot? Better to have it stopped before it goes too far. It might be argued that this periodical hobnobbing with the doctor may make a man too fearful of himself, may make him hypochondriacal. But why should it?

It might more reasonably be asked: 'Is it really any good?' Here is an American answer.

Some time ago, as the result of a firm conviction in the value of a periodic medical examination Professor Irving Fisher and others founded the Life Extension Institute, through which the ideal of such an examination has been made real. 'The chief object was to harness up the profit-making motive of the life insurance companies to the task of lengthening human life.' The Metropolitan Life Insurance Company of New York, after using this service for six years, put its statistical department on to the job of working out the results. Was it worth spending money on providing a free periodic medical examination for its policy-holders? 'The results were so astonishing that the actuarial department and the medical department refused to believe them, until forced to do so by going over the records for themselves.' It was found that spending $60,000 on medically examining 6,000 people within six years saved the company $120,000, through the premiums of people whose lives had been extended. Research carried out over a period of nine years showed that periodic medical examination resulted in an average reduction of 18 per cent in the death-rate of the policy-holders. The early detection of departures from health and their correction made that difference. Professor Fisher remarks: 'After this record forty-four other life insurance companies joined the service.' At all events you may well think it worth while discussing the question with your family doctor.

The experience recorded above raises the question: Can

we get back to Methuselah? Are we necessarily to be contented with the psalmist's allotted span of days? Why can't we go on brushing up health for eighty, ninety, or a hundred years? Professor Fisher and others think that we can. Human beings already live much longer than they used to. During the seventeenth and eighteenth centuries in Europe human life was becoming longer at the rate of about four years a century; during the first three-quarters of the nineteenth century at the rate of nine years, and during the last quarter at the rate of seventeen.

In the United States of America, England, and Germany, during the first quarter of the twentieth century life lengthened at the astonishing rate of forty years per century. Where do we step off? The increasing control of disease given us by the discoveries of modern medicine suggest that the rate may not only be maintained but even accelerated. Dr Hornell Hart of Bryn Mawr College believes that by the year 2000 the average duration of human life will be one hundred years, and that many babies born then will live to be two hundred years old.

The control of diabetes by insulin and of pernicious anaemia with liver extract; prophylaxis against diphtheria, measles, typhoid fever, yellow fever, and other infections; the new knowledge of nutrition; the discovery of new hormones from the ductless glands; the new psychology; the perfected skill of the surgeon and the anaesthetist; the diagnostic and therapeutic uses of X-rays; the discovery of such potent and life-saving drugs as sulphanilamide, which kills the germ of puerperal fever—these are but a few of the amazing achievements of modern medicine, achievements made within so narrow a compass of time, within the life-span of many men living now. It is all that medical education and medical organization can do to keep pace with the great accessions to medical knowledge that are now being made. But it is there at your disposal if you wish to use it.

APPENDIX I

Key to
RAPID SELF-EXAMINATION
of General Intelligence

Scoring Directions:

Each problem is scored either right or wrong. No part credits are given. No credit is given for doing more than the instructions require. If two answers are marked the problem is wrong. Dollar signs and decimals may be omitted. Fractions may be expressed as decimals. Any clear method of indicating an answer is given full credit. For each test except Test IV and Test V the correct total is the number RIGHT. For Test IV and for Test V the correct total is the number RIGHT minus the number WRONG. Subtract the number of wrong problems from the number of right problems for the correct total for these tests. A total less than zero is counted as zero. Omitted items are not counted as wrong, but simply disregarded.

SCORING TABLE

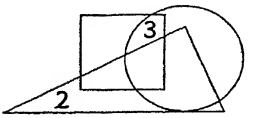
Tests	*Method of Scoring*	*Maximum Score*
I	Number Right	6
II	Number Right	10
III	Number Right	8
IV	Number Right Minus Wrong	20
V	Number Right Minus Wrong	12
VI	Number Right	10
VII	Number Right	20
VIII	Number Right	20
Total Score		106

If ten seconds more than the 'working time' allowed was used in any test the nearest approach to accuracy can be secured by applying the following correction process: reduce this extra time (over the working time) to a per cent of the working time; then reduce the test score the amount of this percentage.

KEYS TO TESTS

TEST I

1. 

2. 

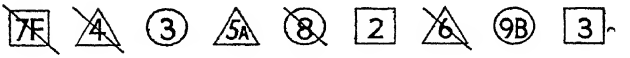
3. 

Any number but twelve.

4. A B C D E F G H I J K L M N O P

5. R C M

FOREMAN CLERK
MACHINIST

6. 

Test II	*Test III*	*Test V*	*Test VI*
(1) 36	1. x	1. true — false 1	40 45
(2) 6		2. true — false 2	24 27
(3) 16	2. x	3. true — false 3	2 1
(4) 80	3. x	4. true — false 4	64 128
(5) 40		5. true — false 5	2 2
(6) 10	4.	6. true — false 6	24 31
(7) 21	x	7. true — false 7	8 1
(8) 18	5. x		1/4 1/8

Test II	*Test III*	*Test V*	*Test VI*
(9) 28	6.x———	8. true — false 8	49 64
(10) 3607	———	9. true — false 9	38 76
	7. ———	10. true — false 10	
	x———		
	8. ———	11. true — false 11	
	x———	12. true — false 12	

Test IV	*Test VII*	*Test VIII*
1. same — different 1	1. BED 1	1. CARDS 1
2. same — different 2	2. THANKSGIVING 2	2. PACKING 2
3. same — different 3	3. MEAT 3	3. FOWL 3
4. same — different 4	4. MAN 4	4. KUPPENHEIMER 4
5. same — different 5	5. GOOD 5	5. CHEWING GUM 5
6. same — different 6	6. WOOD 6	6. VEGETABLES 6
7. same — different 7	7. MOUSE 7	7. BRAZIL 7
8. same — different 8	8. NET 8	8. PAINTER 8
9. same — different 9	9. NIECE 9	9. SHOULDER 9
10. same — different 10	10. CLOUDBURST 10	10. TREE 10
11. same — different 11	11. DARK 11	11. COPYING MACHINE 11
12. same — different 12	12. DISAGREEABLE 12	12. MUSIC 12
13. same — different 13	13. BLAME 13	13. STEVENSON 13
14. same — different 14	14. GRIEF 14	14. CYLINDER 14
15. same — different 15	15. SOUND 15	15. SCIENCE 15
16. same — different 16	16. DISCORDANT 16	16. TWO 16
17. same — different 17	17. LOVE 17	17. FARMING 17
18. same — different 18	18. IDIOT 18	18. MANILA BAY 18
19. same — different 19	19. MEMORY 19	19. DETROIT 19
20. same — different 20	20. BRIGHT 20	20. EQUILATERAL 20

APPENDIX II

TABLES OF AVERAGE WEIGHTS FOR AGE AND HEIGHT [1]

MEN

Weight in Pounds

Height	*Age* 15	*Age* 20	*Age* 25	*Age* 30	*Age* 35	*Age* 40	*Age* 45	*Age* 50	*Age* 55
5 ft. 0 in.	107	115	119	123	125	128	130	131	131
5 ,, 1 ,,	109	118	123	128	129	130	131	133	134
5 ,, 2 ,,	112	122	125	129	131	134	135	136	137
5 ,, 3 ,,	115	125	129	133	135	138	140	141	142
5 ,, 4 ,,	118	128	133	136	138	141	143	144	145
5 ,, 5 ,,	122	132	137	140	142	145	147	148	149
5 ,, 6 ,,	126	136	141	144	146	149	151	152	154
5 ,, 7 ,,	130	140	145	148	150	154	155	156	158
5 ,, 8 ,,	134	144	149	153	155	156	157	159	160
5 ,, 9 ,,	138	148	153	157	160	163	165	166	168
5 ,, 10 ,,	142	153	157	162	165	168	170	171	173
5 ,, 11 ,,	147	157	162	166	170	174	176	177	178
6 ,, 0 ,,	152	162	167	172	176	179	182	183	184
6 ,, 1 ,,	157	165	173	178	182	185	187	188	189
6 ,, 2 ,,	162	172	179	183	189	191	193	195	196
6 ,, 3 ,,	167	177	184	189	194	197	199	201	203

WOMEN

Weight in Pounds

Height	*Age* 15	*Age* 20	*Age* 25	*Age* 30	*Age* 35	*Age* 40	*Age* 45	*Age* 50	*Age* 55
5 ft. 0 in.	107	112	115	118	121	124	126	129	130
5 ,, 1 ,,	109	115	118	120	124	127	129	132	133
5 ,, 2 ,,	112	118	120	123	127	130	132	136	137
5 ,, 3 ,,	115	121	124	127	130	134	138	141	141
5 ,, 4 ,,	118	124	128	131	134	137	141	144	144
5 ,, 5 ,,	122	128	131	134	138	141	145	148	148
5 ,, 6 ,,	126	132	135	138	142	145	149	152	153
5 ,, 7 ,,	130	136	139	142	146	149	153	156	158
5 ,, 8 ,,	134	140	143	146	150	153	157	161	163
5 ,, 9 ,,	138	143	147	150	154	158	161	165	168
5 ,, 10 ,,	142	147	151	154	157	162	164	169	172
5 ,, 11 ,,	147	151	154	158	160	166	168	173	176
6 ,, 0 ,,	152	156	158	163	167	170	173	177	180

[1] From *Weight Reduction : Diet and Dishes*, by E. E. Claxton.

APPENDIX III

NUTRITIVE VALUE OF FOODS[1]

	Food	'Good' Protein	Minerals	Vitamins A	Vitamins B	Vitamins C	Vitamins D	
	Milk	++	+++	+	+	+ø	+ø	Highly protective foods.
	Cheese	++	++	+	+	—	—	
E	Eggs	++	++	+	++	—	++	
E	Liver	++	++	+	++	—	+	
E	Fat fish (herrings, etc.)	+		+	+	—	++	
	Green vegetables, salads	+	+++	+	+	++	—	
	Raw fruit, fruit juices		+++	+*	+	++	—	
E	Butter	—	—	+	—	—	+ø	
	Cod-liver oil	—	—	+++	—	—	+++	
	Yeast	+	+	—	++	—	—	Less protective foods.
	Meat (muscle)	+	⊥	—	+	⊥	—	
	Root vegetables, tubers			+*	+	+	—	
	Legumes (dry peas, lentils)			—	+	—	—	Non-protective foods.
E	Cereals, bread (wholemeal)	+	⊥	⊥	+	—	—	
	Cereals, bread (white)			—	—	—	—	
E	Cereals, rice (polished)			—	—	—	—	
E	Nuts	⊥		—	++	—	—	
E	Sugar, jam, honey			—	—	—	—	
E	Margarine, olive oil and other vegetable oils			—	—	—	—	

E = foods of high energy or caloric value.
+++ signifies very rich.
++ signifies rich.
+ signifies present.
⊥ signifies present in small amount or traces.
— signifies absent.
ø signifies in summer, when the cows are on pasture.
* signifies if yellow in colour.

[1] *Nutrition.* Final Report of the Mixed Committee of the League of Nations on the Relation of Nutrition to Health, Agriculture, and Economic Policy. Geneva, 1937. Official No.: A. 13, 1937, II.A.